NBSIR 79-1361

TAPPI

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 56S
STRENGTH TESTS

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

- Bursting strength
- Tearing strength
- Tensile breaking strength
- Elongation to break
- Tensile energy absorption
- Folding endurance
- Stiffness
- Air resistance
- Grammage
- Smoothness
- Surface pick strength
- K & N ink absorption
- pH
- Opacity
- Blue reflectance (brightness)
- Specular gloss, 75°
- Thickness
- Concora (flat crush)
- Ring crush

FKBG-API Containerboard (48 times per year)

- Mullen burst of linerboard
- Concora test of medium

MCCA Color and Appearance (4 times per year)

- Gloss at 60°
- Color and color difference
- Retroreflectivity

Rubber (4 times per year)

- Tensile strength, ultimate elongation and tensile stress
- Hardness
- Mooney viscosity
- Vulcanization properties

ASTM Textiles (3 times per year)

- Flammability (FF3-71 and FF5-74)

ASTM Cement (2 times per year)

- Chemical (11 chemical components)
- Physical (8 characteristics)

AASHTO Bituminous

- Asphalt cement (2 times per year)
- Cutbacks (once a year)

Collaborative Reference Programs
B360 Polymer Building
National Bureau of Standards
Washington, D.C. 20234

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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 56S
STRENGTH TESTS

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U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 56S and 56G comprise the second set of reports for the 78-79 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Notes and comments to individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 4 of this report for an explanation of "Best Values". Please do not confuse these Best Values with provisional values included with the samples to detect serious discrepancies at the time of test.

If there are any questions on the notes, the analyses, or the reports in general, contact Robert G. Powell or Jeffrey Horlick on 301/921-2946.

Jeffrey Horlick

Jeffrey Horlick, Administrator
NBS-TAPPI Collaborative Reference Program
Office of Testing Laboratory Evaluation Technology

January 26, 1979

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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90-1 Thickness (Caliper)
95-1 Grammage (Basis Weight)

TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

Physical Quantity	To Convert From	To	Multiply by
Bursting strength	psi	kPa	6.895
	kg/cm^2	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
Tensile energy absorption	$ft-lb/ft^2$	J/m^2	14.59
	$in.-lb/in.^2$	J/m^2	175.1
	$kg-m/m^2$	J/m^2	9.807
Bending stiffness	g·cm	µN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	µm	25.40

KEY TO TABLES AND GRAPHS

MEAN -	The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST D.) and again at the bottom of this table.
GRAND MEAN - (GR. MEAN)	The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, # , or +. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.
SD OF MEANS - (SD MEANS)	The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.
DEV -	The deviation or difference of the laboratory MEAN from the GRAND MEAN.
N. DEV -	The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N. DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.
SDR -	The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.
AVERAGE SDR -	The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.
R. SDR -	The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR: an indication of the ability of a participant to repeat his measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R. SDR should be to unity. If R. SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test Determinations	Lower limit for R. SDR	Upper limit for R. SDR
3	0.09	2.58
5	0.27	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR -	Code for instrument type or variation in condition, see second table.
F -	Flag, with following meaning:
+ -	Excluded from grand means because VAR non-standard for this analysis
# -	Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See NOTES following Table 1 for each method.)
M -	Excluded because data for one sample are missing
X -	Excluded because plotted point would fall outside of the 99% error ellipse, (see below for explanation of Graph)
* -	Included in grand means but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his testing procedure
S -	Included in grand mean but only after omission of one of more 'wild' values; that is, test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.
O -	Included in grand mean and inside 95% error ellipse.
COORDINATES -	Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.

95% ELLIPSE - Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R. SDR - Average of the R. SDR for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph - For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45°. The solid sloping line, which may or may not lie close to the 45° line, is along the major axis of the error ellipse. The ellipse is drawn so that , on the average, it will include 95% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'O'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he is following.

The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis the graph is not plotted.

The International System of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.

Summary - (At end of report)	In addition to several quantities already defined above the summary shows the following values for each test method:
REPL CRP -	The number of replicate test determinations used in this Collaborative Reference Program.
REPL TAPPI -	The number of replicate test determinations in a test result required by the applicable TAPPI Standard or assumed here if there is no TAPPI Standard. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVER SDR. See TAPPI Standard T1206 for definitions and computations.
REPEAT -	TAPPI repeatability, a measure of the within-laboratory precision of a test result.
REPROD -	TAPPI reproducibility, a measure of the between-laboratory precision of a test result.
Best values -	Given at the end of Table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (±) limits, when these are shown along with the best values.

ANALYSIS 110-1 TABLE 1
BURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C

LAB	SAMPLE J39	PRINTING 149 GRAMS PER SQUARE METER				SAMPLE J67	PRINTING 76 GRAMS PER SQUARE METER				TEST D.= 15		
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L121	27.77	-1.43	-.84	1.76	1.13	15.63	-1.03	-.66	1.23	1.11	10C	O	L121
L131	25.93	-3.26	-1.92	.88	.57	15.27	-1.40	-.90	.46	.41	10C	O	L131
L150	29.97	.77	.45	.90	.58	18.07	1.40	.91	.92	.83	10C	O	L150
L153	32.17	2.97	1.75	1.70	1.09	19.10	2.44	1.57	1.35	1.21	10C	O	L153
L167	28.67	-.52	-.31	.66	.42	17.81	1.15	.74	.64	.58	10C	O	L167
L183	29.80	.60	.35	1.65	1.06	16.03	-.63	-.41	1.11	1.00	10C	O	L183
L191	27.27	-1.93	-1.14	1.55	1.00	12.83	-3.83	-2.47	1.32	1.18	10C	*	L191
L203A	29.90	.70	.41	2.71	1.74	15.73	-.93	-.60	1.29	1.16	10C	O	L203A
L203B	27.87	-1.33	-.78	1.92	1.24	15.77	-.90	-.58	.68	.61	10C	O	L203B
L207	31.63	2.44	1.43	1.79	1.15	19.23	2.57	1.66	1.88	1.69	10C	O	L207
L212	28.20	-1.00	-.59	1.85	1.19	17.17	.50	.33	1.08	.97	10C	O	L212
L223A	33.60	4.40	2.59	1.18	.76	19.93	3.27	2.11	1.16	1.04	10C	*	L223A
L225	30.33	1.14	.67	1.05	.67	17.73	1.07	.69	1.15	1.03	10C	O	L225
L232	17.40	-11.80	-6.94	1.54	.99	11.03	-5.63	-3.63	1.36	1.22	10C	#	L232
L237A	27.27	-1.93	-1.14	1.33	.86	13.40	-3.26	-2.11	.91	.82	10C	O	L237A
L237B	28.73	-.46	-.27	1.22	.79	15.73	-.93	-.60	.96	.86	10C	O	L237B
L248	28.78	-.42	-.25	1.26	.81	17.30	.64	.41	.92	.83	10E	O	L248
L249	29.74	.54	.32	1.75	1.12	17.46	.80	.52	1.01	.90	10C	O	L249
L261	27.40	-1.80	-1.06	1.43	.92	5.80	-10.86	-7.01	.59	.53	10C	#	L261
L264	28.93	-.26	-.16	.96	.62	17.27	.60	.39	.88	.79	10C	O	L264
L268	31.71	2.51	1.48	2.17	1.40	17.15	.49	.32	1.15	1.03	10C	O	L268
L274	29.60	.40	.24	1.45	.94	17.33	.67	.43	.88	.79	10C	O	L274
L278	28.57	-.63	-.37	2.48	1.60	15.67	-1.00	-.64	1.05	.94	10C	O	L278
L279	28.93	-.26	-.16	1.57	1.01	16.43	-.23	-.15	1.60	1.44	10C	O	L279
L299	37.43	8.24	4.85	2.43	1.56	19.30	2.64	1.70	1.58	1.42	10C	#	L299
L305	31.20	2.00	1.18	.80	.51	16.70	.04	.02	1.26	1.14	10C	O	L305
L312	27.68	-1.52	-.89	1.28	.82	15.59	-1.08	-.69	1.07	.96	10C	O	L312
L315	31.03	1.84	1.08	1.51	.97	18.50	1.84	1.19	1.14	1.02	10C	O	L315
L321	34.27	5.07	2.98	2.00	1.29	16.93	.27	.18	1.05	.94	10C	X	L321
L326	28.35	-.84	-.50	2.17	1.40	16.87	.20	.13	1.46	1.31	10C	O	L326
L330	31.42	2.22	1.31	1.24	.80	17.14	.48	.31	1.09	.98	10C	O	L330
L331	29.27	.07	.04	2.31	1.49	16.47	-.20	-.13	1.51	1.35	10C	O	L331
L333	26.35	-2.85	-1.68	1.47	.95	14.02	-2.64	-1.71	1.31	1.17	10C	O	L333
L339	26.30	-2.90	-1.71	1.73	1.11	13.20	-3.46	-2.23	1.45	1.30	10C	O	L339
L344	27.83	-1.36	-.80	1.33	.86	15.73	-.93	-.60	1.12	1.00	10C	O	L344
L356	27.31	-1.89	-1.11	1.38	.89	16.90	.24	.15	1.46	1.31	10C	O	L356
L358	28.89	-.30	-.18	1.19	.76	16.40	-.26	-.17	.51	.46	10C	O	L358
L360	29.27	.07	.04	2.08	1.34	17.77	1.11	.72	.87	.78	10C	O	L360
L366	28.63	-.56	-.33	1.85	1.19	17.20	.54	.35	1.31	1.17	10C	O	L366
L390	30.70	1.50	.88	1.46	.94	17.77	1.10	.71	.90	.81	10C	O	L390
L563	30.57	1.37	.81	1.67	1.07	16.70	.04	.02	.88	.79	10C	O	L563
L568	29.47	.27	.16	1.70	1.09	17.73	1.07	.69	1.73	1.55	10C	O	L568
L599	29.09	-.10	-.06	1.23	.79	17.07	.41	.27	1.00	.90	10C	O	L599
L626	NO DATA REPORTED FOR SAMPLE J39					17.34	.67	.43	1.17	1.05	10C	M	L626

GR. MEAN = 29.20 PSI GRAND MEAN = 16.66 PSI TEST DETERMINATIONS = 15
SD MEANS = 1.70 PSI SD OF MEANS = 1.55 PSI 39 LABS IN GRAND MEANS
AVERAGE SDR = 1.55 PSI AVERAGE SDR = 1.11 PSI
GR. MEAN = 201.3 KILOPASCAL GRAND MEAN = 114.9 KILOPASCAL

L128	30.20	1.00	.59	.68	.44	18.33	1.67	1.08	.90	.81	10B	+	L128
L242	30.38	1.18	.70	1.10	.71	19.34	2.68	1.73	1.00	.90	10T	+	L242
L250L	30.06	.87	.51	1.25	.81	20.35	3.69	2.38	1.51	1.36	10N	+	L250L
L251	29.00	-.20	-.12	1.94	1.25	17.93	1.27	.82	1.27	1.14	10V	+	L251
L269	36.67	7.47	4.40	1.84	1.18	24.33	7.67	4.95	1.05	.94	10A	+	L269
L484	27.50	-1.70	-1.00	1.13	.73	15.20	-1.46	-.94	.86	.77	10M	+	L484

TOTAL NUMBER OF LABORATORIES REPORTING = 50

Best values: J39 29.0 ± 2.7 psi
J67 16.7 ± 2.7 psi

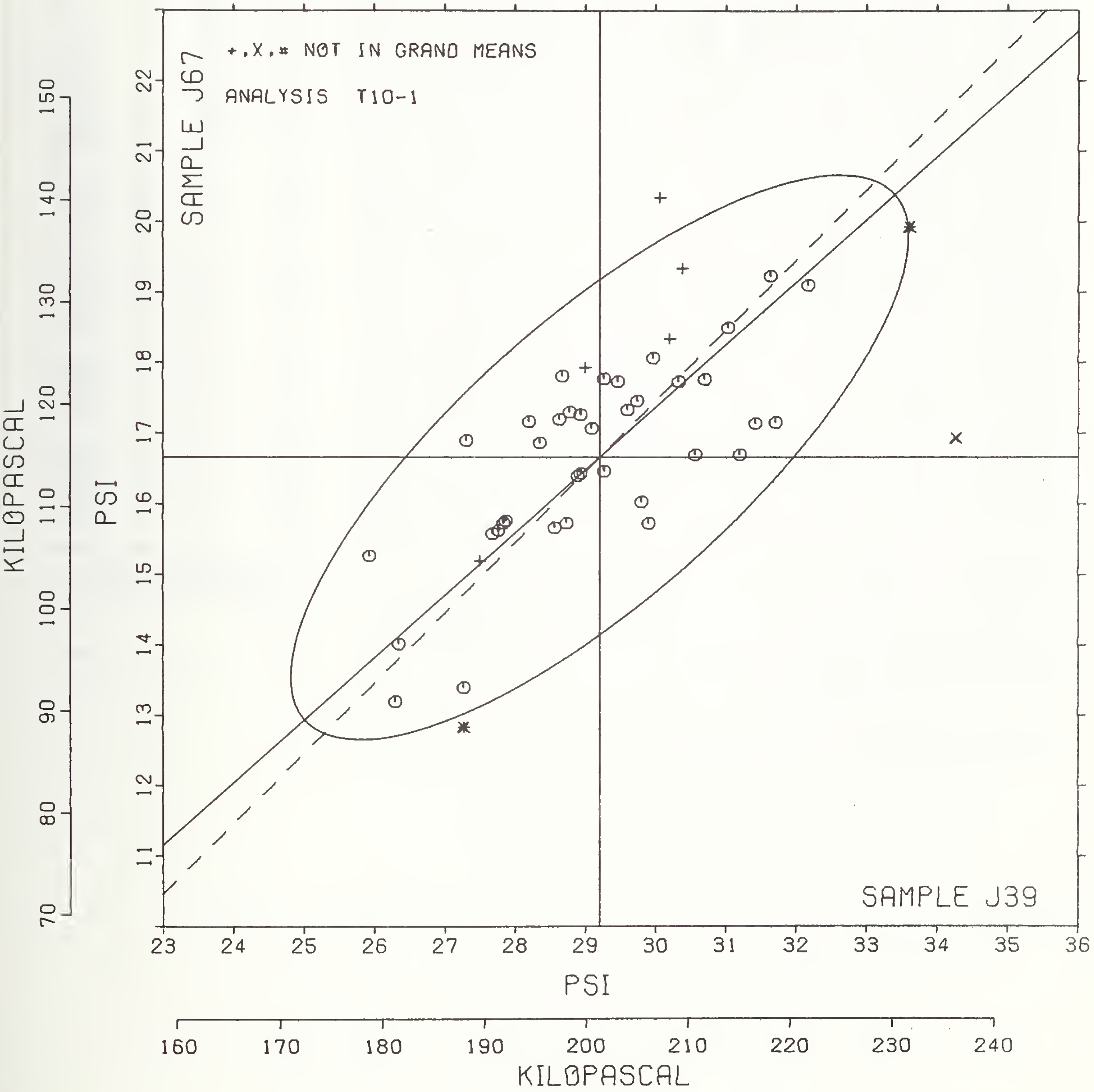
The following laboratories were omitted from the grand means because of extreme test results: 232, 261, 299.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T10-1 TABLE 2
BURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C

LAB		MEANS		COORDINATES		AVG		
CODE	F	J39	J67	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L626	M		17.34			1.05	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L232	#	17.40	11.03	-12.56	3.63	1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L131	O	25.93	15.27	-3.37	1.12	.49	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L339	O	26.30	13.20	-4.47	-.66	1.21	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L333	O	26.35	14.02	-3.89	-.08	1.06	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L191	*	27.27	12.83	-3.99	-1.58	1.09	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237A	O	27.27	13.40	-3.61	-1.16	.84	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L356	O	27.31	16.90	-1.26	1.43	1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L261	#	27.40	5.80	-8.56	-6.93	.73	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L484	•	27.50	15.20	-2.24	.03	.75	10M	BURSTING STRENGTH UP TO 45 PSI,REGMED MT/MOT,MANUAL CLAMP
L312	O	27.68	15.69	-1.85	.20	.89	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L121	O	27.77	15.63	-1.75	.18	1.12	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L344	O	27.83	15.73	-1.64	.21	.93	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203B	O	27.87	15.77	-1.59	.21	.92	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L212	O	28.20	17.17	-.41	1.04	1.08	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L326	O	28.35	16.87	-.50	.71	1.35	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L278	O	28.57	15.67	-1.13	-.33	1.27	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L366	O	28.63	17.20	-.07	.78	1.18	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L167	O	28.67	17.81	.37	1.21	.50	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237B	O	28.73	15.73	-.96	-.39	.83	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L248	O	28.78	17.30	.11	.76	.82	10E	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L358	O	28.89	16.40	-.40	.01	.61	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L279	O	28.93	16.43	-.35	.00	1.22	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L264	O	28.93	17.27	.20	.63	.71	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L251	•	29.00	17.93	.69	1.08	1.19	10V	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP, 20C,65% RH
L599	O	29.09	17.07	.19	.38	.85	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L360	O	29.27	17.77	.79	.79	1.06	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L331	O	29.27	16.47	-.08	-.19	1.42	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L568	O	29.47	17.73	.91	.62	1.32	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L274	O	29.60	17.33	.75	.23	.86	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L249	O	29.74	17.46	.94	.24	1.01	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L183	O	29.80	16.03	.03	-.87	1.03	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203A	O	29.90	15.73	-.09	-1.16	1.45	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L150	O	29.97	18.07	1.51	.54	.70	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L250L	•	30.06	20.35	3.09	2.18	1.08	10N	BURSTING STRENGTH UP TO 45 PSI,LBOMARGY,MAN.CLAMP, 20C,65%RH
L128	•	30.20	18.33	1.86	.58	.62	10B	BURSTING STRENGTH UP TO 45 PSI, PERKINS B, MANUAL CLAMP
L225	O	30.33	17.73	1.56	.05	.85	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L242	•	30.38	19.34	2.67	1.22	.80	10T	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP
L563	O	30.57	16.70	1.05	-.88	.93	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L390	O	30.70	17.77	1.86	-.17	.88	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L315	O	31.03	18.50	2.59	.16	1.00	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L305	O	31.20	16.70	1.52	-1.30	.82	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L330	O	31.42	17.14	1.98	-1.12	.89	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L207	O	31.63	19.23	3.53	.31	1.42	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L268	O	31.71	17.15	2.20	-1.30	1.22	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L153	O	32.17	19.10	3.84	-.15	1.15	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L223A	*	33.60	19.93	5.46	-.48	.90	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L321	X	34.27	16.93	3.97	-3.16	1.12	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L269	•	36.67	24.33	10.68	.78	1.06	10A	BURSTING STRENGTH UP TO 45 PSI, PERKINS A, MANUAL CLAMP
L299	#	37.43	19.30	7.91	-3.50	1.49	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
GMEANS:		29.20	16.66			1.00		
		95% ELLIPSE:		5.61	1.97	WITH GAMMA = 41 DEGREES		

BURSTING STRENGTH, MODEL C

SAMPLE J39 = 29.2 PSI SAMPLE J67 = 16.7 PSI
SAMPLE J39 = 201 KILOPASCAL SAMPLE J67 = 115 KILOPASCAL



ANALYSIS T10-2 TABLE 1
BURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D.= 15		
LAB	J39	149 GRAMS PER SQUARE METER				J67	76 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	29.1	-.2	-.17	3.2	2.17	13.3	-4.0	-3.40	1.4	1.16	10D	X	L105
L115	30.3	1.0	.68	.9	.63	18.2	.9	.78	1.0	.80	10D	0	L115
L122	28.8	-.5	-.35	1.3	.88	16.8	-.5	-.40	1.4	1.14	10F	0	L122
L125	28.9	-.4	-.26	2.0	1.35	15.3	-2.0	-1.71	1.8	1.43	10D	0	L125
L141	29.4	.1	.06	1.9	1.30	16.9	-.3	-.29	1.6	1.30	10D	0	L141
L148	31.2	1.9	1.29	1.0	.68	18.6	1.3	1.12	1.0	.79	10D	0	L148
L162	27.1	-2.2	-1.49	1.9	1.26	15.3	-1.9	-1.65	1.2	.99	10D	0	L162
L163	28.6	-.7	-.51	1.4	.96	16.9	-.4	-.35	1.5	1.22	10D	0	L163
L166	30.6	1.3	.86	1.7	1.12	17.8	.6	.47	.7	.60	10D	0	L166
L185	32.5	3.2	2.16	1.7	1.15	19.7	2.4	2.03	1.6	1.27	10D	0	L185
L190C	28.1	-1.2	-.81	1.1	.75	17.8	.5	.44	1.2	.97	10D	0	L190C
L190R	28.1	-1.2	-.85	1.4	.92	16.2	-1.1	-.91	1.3	1.08	10D	0	L190R
L194	27.5	-1.8	-1.21	.9	.60	17.3	.0	.04	.6	.49	10D	0	L194
L217	28.7	-.6	-.40	.8	.53	18.5	1.2	1.01	1.2	.95	10F	0	L217
L224	30.6	1.3	.91	1.9	1.27	17.4	.1	.08	2.1	1.67	10D	0	L224
L226B	29.7	.4	.27	1.3	.89	17.7	.4	.35	1.6	1.30	10D	0	L226B
L226C	31.0	1.7	1.17	1.5	.98	17.9	.7	.56	1.3	1.00	10D	0	L226C
L241	32.0	2.7	1.82	1.5	.97	17.9	.6	.50	1.2	1.00	10D	0	L241
L255	27.9	-1.4	-.94	.7	.47	16.6	-.7	-.57	.6	.51	10D	0	L255
L257A	29.6	.3	.20	1.8	1.18	16.9	-.4	-.35	1.2	.95	10D	0	L257A
L257B	29.5	.2	.11	1.4	.94	17.3	-.0	-.01	1.3	1.07	10D	0	L257B
L257C	29.6	.3	.20	2.2	1.45	17.6	.3	.27	1.4	1.08	10D	0	L257C
L262	30.5	1.2	.84	1.6	1.05	18.3	1.0	.84	1.7	1.39	10D	0	L262
L275	25.1	-4.2	-2.88	2.5	1.67	11.7	-5.5	-4.70	1.3	1.06	10D	#	L275
L280	30.1	.8	.53	1.1	.76	18.2	.9	.77	1.3	1.02	10D	0	L280
L285	28.6	-.7	-.49	1.7	1.12	16.1	-1.1	-.97	1.4	1.09	10D	0	L285
L309	26.6	-2.7	-1.84	2.3	1.54	14.4	-2.8	-2.41	1.0	.84	10D	0	L309
L352	26.6	-2.7	-1.87	2.1	1.43	15.4	-1.9	-1.61	1.0	.79	10D	0	L352
L567	28.8	-.5	-.35	1.1	.72	18.8	1.5	1.29	.8	.62	10D	0	L567
L581	29.4	.1	.08	1.7	1.11	17.7	.5	.39	1.1	.85	10D	0	L581
L587	29.6	.3	.20	1.5	.97	17.6	.3	.27	1.0	.79	10D	0	L587

GR. MEAN = 29.3 PSI GRAND MEAN = 17.3 PSI TEST DETERMINATIONS = 15
SD MEANS = 1.5 PSI SD OF MEANS = 1.2 PSI 29 LABS IN GRAND MEANS
AVERAGE SDR = 1.5 PSI AVERAGE SDR = 1.2 PSI
GR. MEAN = 202.1 KILOPASCAL GRAND MEAN = 119.1 KILOPASCAL

LAB CODE	J39 MEAN	DEV	N.DEV	SDR	R.SDR	J67 MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L313	26.4	-2.9	-1.99	1.1	.76	14.4	-2.9	-2.47	1.2	.94	10I	*	L313

TOTAL NUMBER OF LABORATORIES REPORTING = 32

Best values: J39 29.2 ± 2.5 psi
J67 17.3 ± 1.9 psi

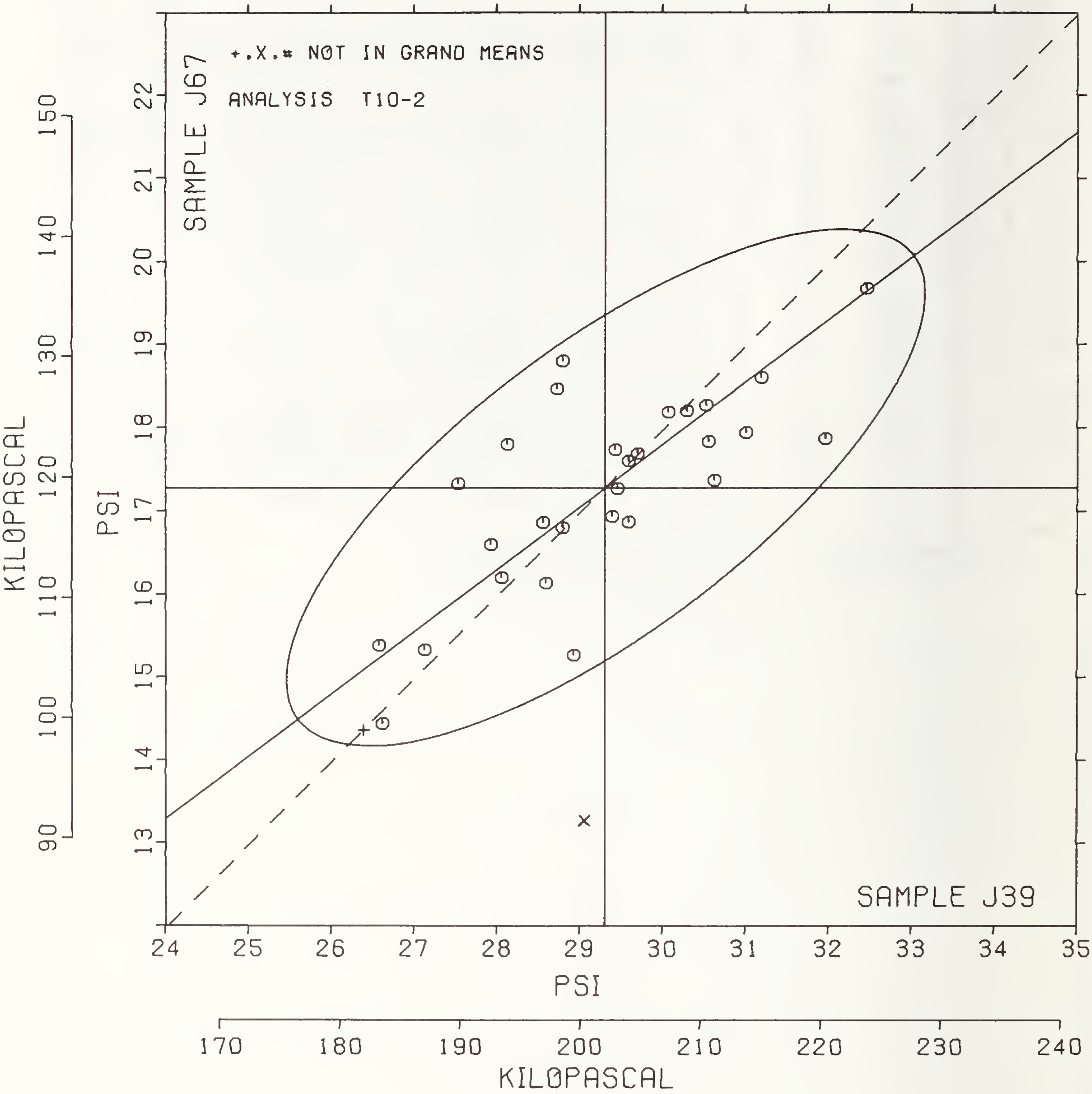
The following laboratories were omitted from the grand means because of extreme test results: 275.

ANALYSIS T10-2 TABLE 2
BURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	F	MEANS J39	J67	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L275	#	25.1	11.7	-6.7	-1.9	1.37	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L313	*	26.4	14.4	-4.1	-.6	.85	10I	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L352	O	26.6	15.4	-3.3	.1	1.11	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L309	O	26.6	14.4	-3.8	-.7	1.19	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L162	O	27.1	15.3	-2.9	-.2	1.12	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L194	O	27.5	17.3	-1.4	1.1	.55	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L255	O	27.9	16.6	-1.5	.3	.49	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190R	O	28.1	16.2	-1.6	-.1	1.00	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190C	O	28.1	17.8	-.6	1.1	.86	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L163	O	28.6	16.9	-.8	.1	1.09	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L285	O	28.6	16.1	-1.3	-.5	1.11	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L217	O	28.7	18.5	.3	1.3	.74	10F	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L567	O	28.8	18.8	.5	1.5	.67	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L122	O	28.8	16.8	-.7	-.1	1.01	10F	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L125	O	28.9	15.3	-1.5	-1.4	1.39	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L105	X	29.1	13.3	-2.6	-3.1	1.66	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L141	O	29.4	16.9	-.1	-.3	1.30	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L581	O	29.4	17.7	.4	.3	.98	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257B	O	29.5	17.3	.1	-.1	1.00	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L587	O	29.6	17.6	.4	.1	.88	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257A	O	29.6	16.9	-.0	-.5	1.07	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257C	O	29.6	17.6	.4	.1	1.27	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226B	O	29.7	17.7	.6	.1	1.09	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L280	O	30.1	18.2	1.2	.3	.89	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L115	O	30.3	18.2	1.3	.1	.71	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L262	O	30.5	18.3	1.6	.1	1.22	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L166	O	30.6	17.8	1.3	-.3	.86	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L224	O	30.6	17.4	1.1	-.7	1.47	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226C	O	31.0	17.9	1.8	-.5	.99	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L148	O	31.2	18.6	2.3	-.1	.73	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L241	O	32.0	17.9	2.5	-1.1	.99	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L185	O	32.5	19.7	4.0	.0	1.21	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
GMEANS:		29.3	17.3			1.00		
		95% ELLIPSE:		4.6	1.7	WITH GAMMA = 36 DEGREES		

BURSTING STRENGTH, MODEL C-A

SAMPLE J39 = 29.3 PSI
SAMPLE J39 = 202 KILOPASCAL
SAMPLE J67 = 17.3 PSI
SAMPLE J67 = 119 KILOPASCAL



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T11-1 TABLE 1
BURSTING STRENGTH, HIGH RANGE, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C OR C-A

	SAMPLE	KRAFT				SAMPLE	PRINTING				TEST D. = 15		
LAB	K29	123 GRAMS PER SQUARE METER				K27	105 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	P	LAB
L103	61.2	1.9	.82	3.0	.73	49.7	-.6	-.27	2.1	.56	11C	0	L103
L107	60.3	.9	.42	3.3	.79	49.9	-.5	-.20	4.1	1.08	11C	0	L107
L122	59.3	-.1	-.02	4.0	.96	52.3	1.9	.81	3.6	.96	11P	0	L122
L128	58.8	-.5	-.23	2.5	.60	50.3	-.1	-.03	2.2	.58	11D	0	L128
L141	62.7	3.3	1.47	5.6	1.33	52.4	2.1	.86	3.9	1.03	11D	0	L141
L148	60.6	1.3	.56	3.0	.73	52.6	2.3	.95	3.1	.82	11D	0	L148
L182	58.5	-.9	-.38	5.2	1.24	50.2	-.1	-.06	2.9	.78	11D	0	L182
L218	59.2	-.1	-.04	5.1	1.23	52.4	2.0	.85	4.1	1.09	11D	0	L218
L232	45.4	-13.9	-6.13	5.8	1.39	32.9	-17.4	-7.28	5.7	1.53	11C	#	L232
L237A	58.4	-.9	-.41	2.3	.56	49.5	-.8	-.34	1.7	.45	11C	0	L237A
L237B	59.0	-.3	-.14	1.8	.43	48.2	-2.1	-.89	1.8	.49	11C	0	L237B
L238A	62.2	2.8	1.25	4.3	1.02	54.5	4.1	1.72	4.2	1.11	11Y	0	L238A
L248	55.7	-3.6	-1.57	4.7	1.12	50.3	-.0	-.01	2.6	.68	11E	0	L248
L278	57.5	-1.9	-.82	4.3	1.04	50.9	.5	.22	5.5	1.47	11C	0	L278
L279	57.9	-1.5	-.64	4.5	1.09	49.0	-1.3	-.56	4.0	1.08	11C	0	L279
L280	60.0	.7	.30	3.1	.74	50.3	-.1	-.02	4.5	1.21	11D	0	L280
L330	63.6	4.3	1.87	6.1	1.46	54.5	4.1	1.72	6.2	1.65	11C	0	L330
L331	62.5	3.2	1.40	5.6	1.34	54.1	3.8	1.59	5.0	1.35	11C	0	L331
L333	58.4	-.9	-.41	3.8	.91	48.3	-2.1	-.87	4.0	1.06	11C	0	L333
L344	59.4	.0	.02	5.3	1.27	47.3	-3.0	-1.27	3.4	.91	11C	0	L344
L356	57.5	-1.8	-.80	4.5	1.07	49.1	-1.2	-.50	4.6	1.22	11C	0	L356
L567	57.8	-1.5	-.67	3.4	.82	50.1	-.2	-.09	4.2	1.12	11D	0	L567
L581	56.1	-3.3	-1.43	4.6	1.10	45.8	-4.5	-1.90	4.7	1.26	11D	0	L581
L599	59.3	-.1	-.02	3.7	.90	49.6	-.7	-.31	4.5	1.21	11C	0	L599
L604	62.3	3.0	1.32	5.6	1.34	52.8	2.5	1.04	3.3	.88	11C	0	L604
L622	60.4	1.0	.46	3.7	.89	49.6	-.8	-.32	3.4	.90	11E	0	L622
L650	54.1	-5.3	-2.31	5.4	1.29	45.2	-5.1	-2.15	3.9	1.04	11D	0	L650
L651	69.1	9.8	4.32	4.0	.97	58.5	8.1	3.40	3.6	.96	11D	#	L651

GR. MEAN = 59.3 PSI GRAND MEAN = 50.3 PSI TEST DETERMINATIONS = 15
SD MEANS = 2.3 PSI SD OF MEANS = 2.4 PSI 26 LABS IN GRAND MEANS
AVERAGE SDR = 4.2 PSI AVERAGE SDR = 3.7 PSI
GR. MEAN = 409.0 KILOPASCAL GRAND MEAN = 347.1 KILOPASCAL

LAB CODE	K29 MEAN	DEV	N.DEV	SDR	R.SDR	K27 MEAN	DEV	N.DEV	SDR	R.SDR	VAR	P	LAB
L242	63.5	4.2	1.84	5.7	1.37	54.6	4.3	1.79	2.9	.77	11T	+	L242
L250L	54.2	-5.1	-2.24	3.0	.72	46.8	-3.5	-1.47	3.0	.82	11N	+	L250L
L251	62.6	3.3	1.44	4.5	1.09	51.8	1.5	.62	3.7	.98	11V	+	L251
L274	59.2	-.1	-.05	.9	.23	50.1	-.3	-.11	1.0	.26	11H	+	L274
L290	63.2	3.9	1.71	3.9	.95	54.4	4.1	1.70	2.9	.79	11A	+	L290
L393	59.1	-.3	-.11	3.6	.85	48.8	-1.5	-.64	3.3	.87	11H	+	L393
L394	64.6	5.3	2.32	4.8	1.15	56.9	6.5	2.73	6.3	1.69	11H	+	L394
L484	66.7	7.3	3.23	3.7	.88	57.6	7.3	3.04	2.2	.58	11H	+	L484
L570	63.3	4.0	1.77	3.5	.85	53.5	3.1	1.31	4.1	1.11	11H	+	L570
L576	60.3	.9	.42	6.4	1.53	50.1	-.2	-.09	4.1	1.09	11P	+	L576
L593	71.3	12.0	5.29	6.0	1.44	64.9	14.5	6.08	3.8	1.00	11J	+	L593
L598	57.5	-1.9	-.82	4.2	1.00	50.5	.1	.05	3.6	.95	11*	+	L598

TOTAL NUMBER OF LABORATORIES REPORTING = 40

Best values: K29 59 ± 4 psi
K27 50 ± 4 psi

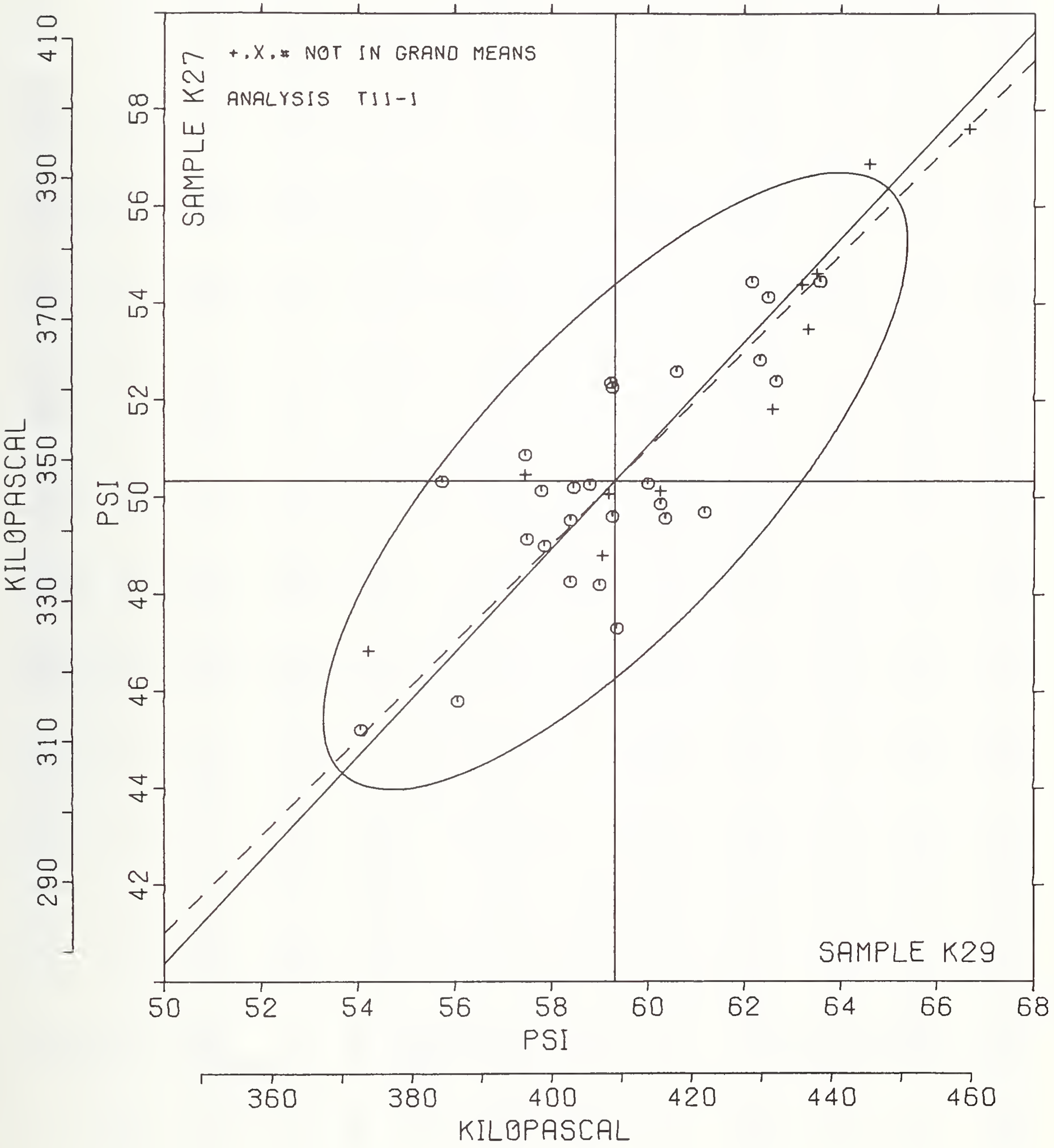
The following laboratories were omitted from the grand means because of extreme test results: 232, 651.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T11-1 TABLE 2
BURSTING STRENGTH, HIGH RANGE, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C OR C-A

LAB		MEANS		COORDINATES		AVG		
CODE	F	K29	K27	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L232	#	45.4	32.9	-22.2	-1.7	1.46	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L650	O	54.1	45.2	-7.3	.3	1.17	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L250L	•	54.2	46.8	-6.0	1.3	.77	11N	BURSTING STRENGTH 40 - 100 PSI,LEOMARGY,MAN.CLAMP, 20C,65%RH
L248	O	55.7	50.3	-2.5	2.6	.90	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L581	O	56.1	45.8	-5.5	-.7	1.18	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L598	•	57.5	50.5	-1.2	1.4	.98	11*	BURSTING STRENGTH 40 - 100 PSI, MESSMER, MANUAL CLAMP
L278	O	57.5	50.9	-.9	1.7	1.25	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L356	O	57.5	49.1	-2.1	.5	1.15	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L567	O	57.8	50.1	-1.2	1.0	.97	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L279	O	57.9	49.0	-2.0	.1	1.08	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L333	O	58.4	48.3	-2.1	-.7	.99	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L237A	O	58.4	49.5	-1.2	.1	.50	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L182	O	58.5	50.2	-.7	.5	1.01	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L128	O	58.8	50.3	-.4	.3	.59	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L237B	O	59.0	48.2	-1.8	-1.2	.46	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L393	•	59.1	48.8	-1.3	-.9	.86	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L274	•	59.2	50.1	-.3	-.1	.24	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L218	O	59.2	52.4	1.4	1.5	1.16	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L122	O	59.3	52.3	1.4	1.4	.96	11F	BURSTING STRENGTH 40 - 100 PSI,PERKINS C, B.CLAMP,TRANSDUCER
L599	O	59.3	49.6	-.6	-.5	1.05	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L344	O	59.4	47.3	-2.2	-2.1	1.09	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L280	O	60.0	50.3	.4	-.5	.97	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L576	•	60.3	50.1	.5	-.8	1.31	11P	BURSTING STRENGTH 40 - 100 PSI, PERKINS LC, MANUAL CLAMP
L107	O	60.3	49.9	.3	-1.0	.94	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L622	O	60.4	49.6	.2	-1.3	.89	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L148	O	60.6	52.6	2.5	.6	.77	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L103	O	61.2	49.7	.8	-1.8	.65	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L238A	O	62.2	54.5	4.9	.7	1.07	11Y	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L604	O	62.3	52.8	3.9	-.5	1.11	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L331	O	62.5	54.1	4.9	.3	1.34	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L251	•	62.6	51.8	3.3	-1.4	1.04	11V	BURSTING STRENGTH 40 - 100 PSI, L•W,MANUAL CLAMP, 20C,65% RH
L141	O	62.7	52.4	3.8	-1.0	1.18	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L290	•	63.2	54.4	5.6	-.1	.87	11A	BURSTING STRENGTH 40 - 100 PSI, PERKINS A, MANUAL CLAMP
L570	•	63.3	53.5	5.0	-.8	.98	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L242	•	63.5	54.6	6.0	-.1	1.07	11T	BURSTING STRENGTH 40 - 100 PSI, L•W,MANUAL CLAMP
L330	O	63.6	54.5	5.9	-.3	1.66	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L394	•	64.6	56.9	8.4	.6	1.42	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L484	•	66.7	57.6	10.3	-.4	.73	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L651	#	69.1	58.5	12.6	-1.6	.97	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L593	•	71.3	64.9	18.8	1.2	1.22	11J	BURSTING STRENGTH 40 - 100 PSI, PERKINS JUMBO,HAND DRIVEN
GMEANS:		59.3	50.3			1.00		
		95% ELLIPSE:		8.3	3.0	WITH GAMMA = 46 DEGREES		

BURSTING STRENGTH, HIGH RANGE

SAMPLE K29 = 59.3 PSI SAMPLE K27 = 50.3 PSI
SAMPLE K29 = 409 KILOPASCAL SAMPLE K27 = 347 KILOPASCAL



REPORT NO. 56S TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1978

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

	SAMPLE	WRITING				SAMPLE	PRINTING				TEST D.= 15		
LAB	E81	69 GRAMS PER SQUARE METER				K25	75 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L103	57.0	-1.8	-.54	.8	.48	41.3	-2.0	-.80	1.3	.82	15T	0	L103
L105	55.7	-3.1	-.92	1.9	1.09	38.7	-4.5	-1.80	1.5	.98	15T	0	L105
L107	55.2	-3.6	-1.08	1.2	.67	39.4	-3.8	-1.52	1.3	.80	15T	0	L107
L115	57.7	-1.1	-.33	1.3	.72	41.5	-1.8	-.72	1.6	.99	15C	0	L115
L121	57.6	-1.2	-.36	1.4	.77	40.9	-2.3	-.93	1.8	1.17	15T	0	L121
L122	56.3	-2.5	-.74	.9	.51	41.9	-1.3	-.53	2.4	1.51	15C	0	L122
L124	56.1	-2.7	-.80	1.4	.81	42.1	-1.1	-.45	1.9	1.23	15T	0	L124
L126	58.9	.1	.02	1.6	.89	43.5	.2	.08	2.2	1.40	15T	0	L126
L128	58.1	-.7	-.20	1.2	.68	44.3	1.1	.43	1.4	.89	15T	0	L128
L131	67.9	9.1	2.70	4.0	2.31	46.3	3.0	1.19	1.8	1.17	15A	*	L131
L139	63.8	5.0	1.48	1.4	.79	48.1	4.8	1.91	1.3	.82	15T	0	L139
L141	57.0	-1.8	-.54	1.4	.81	40.1	-3.1	-1.25	1.7	1.10	15T	0	L141
L143	59.7	.9	.25	7.2	4.13	43.9	.6	.24	1.6	.99	15T	0	L143
L145	61.1	2.3	.67	1.9	1.11	46.9	3.7	1.46	2.6	1.66	15T	0	L145
L148	57.0	-1.8	-.54	1.4	.78	42.3	-1.0	-.40	1.3	.82	15T	0	L148
L150	61.0	2.2	.65	1.6	.94	44.1	.9	.35	.9	.58	15T	0	L150
L151	69.3	10.5	3.13	1.7	.96	49.7	6.4	2.55	1.5	.98	15C	*	L151
L153	57.5	-1.3	-.40	1.5	.86	42.2	-1.1	-.42	1.4	.91	15C	0	L153
L162	57.9	-.9	-.28	1.4	.81	42.5	-.7	-.29	1.6	1.02	15T	0	L162
L163	58.0	-.8	-.24	1.1	.65	41.5	-1.7	-.69	1.3	.83	15T	0	L163
L166	58.0	-.8	-.24	1.5	.84	43.2	-.1	-.03	2.5	1.60	15T	0	L166
L167	58.8	-.0	-.00	.9	.54	43.3	.1	.03	1.2	.79	15C	0	L167
L173B	57.5	-1.3	-.40	1.4	.81	45.9	2.6	1.04	1.4	.90	15T	0	L173B
L182A	55.4	-3.4	-1.02	2.0	1.14	44.1	.9	.35	2.0	1.30	15A	0	L182A
L182T	60.6	1.8	.53	1.1	.64	47.5	4.2	1.67	1.5	.96	15T	0	L182T
L183	57.9	-.9	-.28	1.1	.64	41.0	-2.3	-.90	.0	.00	15T	0	L183
L185	56.4	-2.4	-.72	1.1	.64	44.5	1.2	.48	1.3	.83	15T	0	L185
L189	56.9	-1.9	-.58	.8	.48	40.3	-2.9	-1.17	1.4	.92	15T	0	L189
L190C	57.9	-.9	-.28	1.0	.57	44.0	.7	.29	1.3	.80	15T	0	L190C
L190R	57.2	-1.6	-.48	1.4	.79	42.1	-1.1	-.45	1.4	.87	15C	0	L190R
L191	54.4	-4.4	-1.31	2.2	1.24	39.6	-3.7	-1.46	1.7	1.10	15T	0	L191
L194	63.1	4.3	1.29	.9	.49	46.9	3.7	1.45	1.1	.69	15T	0	L194
L195	61.1	2.3	.67	1.5	.85	44.0	.7	.29	1.5	.96	15C	0	L195
L206	60.7	1.9	.57	1.7	.98	45.6	2.3	.91	1.5	.98	15R	0	L206
L207	50.6	-8.2	-2.43	1.6	.91	101.5	58.2	23.17	1.3	.83	15R	#	L207
L211	54.9	-3.9	-1.16	.8	.46	40.1	-3.1	-1.25	.5	.33	15R	0	L211
L212	58.4	-.4	-.12	3.5	1.99	41.6	-1.7	-.66	3.9	2.46	15T	0	L212
L213	59.9	1.1	.31	1.4	.81	45.3	2.1	.82	1.0	.62	15T	0	L213
L217	58.9	.1	.03	1.3	.72	44.7	1.4	.57	1.4	.92	15T	0	L217
L223	65.3	6.5	1.93	1.4	.79	49.3	6.0	2.40	1.3	.81	15R	0	L223
L224	55.5	-3.3	-1.00	1.4	.81	41.2	-2.1	-.82	1.4	.88	15T	0	L224
L225	59.6	.8	.23	1.2	.68	44.9	1.6	.64	.8	.53	15T	0	L225
L226C	59.9	1.1	.32	1.3	.72	42.2	-1.1	-.44	1.4	.92	15T	0	L226C
L228	58.1	-.7	-.20	2.5	1.45	41.3	-1.9	-.77	1.6	1.04	15T	0	L228
L230	55.7	-3.1	-.91	1.1	.61	40.3	-2.9	-1.17	3.5	2.25	15R	0	L230
L232	59.5	.7	.19	4.0	2.27	42.9	-.3	-.13	1.7	1.06	15T	0	L232
L236	58.2	-.6	-.18	1.3	.76	45.9	2.7	1.06	2.5	1.59	15T	0	L236
L237A	55.2	-3.6	-1.08	1.3	.72	40.7	-2.6	-1.03	1.0	.62	15T	0	L237A
L237B	57.4	-1.4	-.42	1.1	.60	43.1	-.1	-.05	.8	.53	15T	0	L237B
L238A	56.1	-2.7	-.80	1.4	.81	42.9	-.3	-.13	1.5	.95	15T	0	L238A
L241	56.9	-1.9	-.56	2.7	1.55	42.5	-.7	-.29	1.6	1.02	15T	0	L241
L244	58.3	-.5	-.14	1.0	.60	45.3	2.1	.82	1.0	.62	15C	0	L244
L248	57.7	-1.2	-.34	1.7	.98	44.2	.9	.37	1.5	.94	15J	0	L248
L249	61.8	3.0	.89	2.3	1.32	48.4	5.1	2.02	2.1	1.32	15T	0	L249
L254	54.8	-4.0	-1.20	1.0	.58	41.7	-1.5	-.61	1.3	.82	15T	0	L254
L255	57.6	-1.2	-.36	.8	.47	42.4	-.9	-.34	.5	.32	15T	0	L255
L257A	58.3	-.5	-.16	1.3	.73	42.3	-1.0	-.40	1.3	.82	15C	0	L257A
L257B	59.1	.3	.09	1.6	.94	42.0	-1.3	-.50	1.3	.84	15C	0	L257B
L257C	58.0	-.8	-.24	1.5	.87	42.3	-1.0	-.40	1.3	.82	15C	0	L257C
L261	56.1	-2.7	-.80	1.6	.94	41.0	-2.3	-.90	2.3	1.45	15T	0	L261
L262	57.8	-1.0	-.30	.9	.54	41.0	-2.3	-.90	2.0	1.25	15T	0	L262
L264	56.3	-2.5	-.76	1.8	1.05	45.1	1.8	.72	1.8	1.17	15T	0	L264
L268	54.4	-4.4	-1.31	1.3	.74	42.1	-1.1	-.45	.7	.47	15T	0	L268
L273	64.9	6.1	1.82	.9	.51	45.7	2.5	.98	1.2	.74	15T	0	L273
L274	58.9	.1	.04	1.0	.59	44.0	.7	.29	1.3	.84	15T	0	L274

ANALYSIS 115-1 TABLE 1
TEARING STRENGTH, GRAMS
TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

	SAMPLE	WRITING				SAMPLE	PRINTING				TEST D.= 15		
LAB	E81	69 GRAMS PER SQUARE METER				K25	75 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	P	LAB
L275	58.1	-.7	-.20	1.2	.71	44.1	.8	.32	1.7	1.09	15T	0	L275
L277	55.6	-3.2	-.96	1.7	.99	41.6	-1.7	-.66	1.4	.86	15T	0	L277
L278	65.6	6.8	2.02	7.1	4.09	45.3	2.1	.82	2.1	1.34	15T	0	L278
L279	54.7	-4.1	-1.22	1.1	.63	40.6	-2.7	-1.06	1.3	.83	15T	0	L279
L280	58.8	-.0	-.00	4.4	2.54	41.7	-1.6	-.64	1.1	.71	15L	0	L280
L281	53.9	-4.9	-1.45	1.1	.63	40.9	-2.4	-.95	1.7	1.07	15T	0	L281
L285	59.9	1.1	.31	2.1	1.18	39.6	-3.7	-1.46	1.5	.99	15T	*	L285
L288	64.5	5.7	1.69	2.2	1.25	41.3	-2.0	-.80	1.1	.70	15Q	X	L288
L290	59.7	.9	.25	1.3	.74	43.1	-.1	-.05	2.4	1.54	15T	0	L290
L299	60.2	1.4	.41	1.5	.84	43.3	.1	.03	.7	.46	15T	0	L299
L305	63.3	4.5	1.34	2.4	1.39	44.3	1.0	.40	2.0	1.26	15T	0	L305
L309	58.5	-.3	-.08	1.3	.75	42.3	-1.0	-.40	2.1	1.35	15T	0	L309
L312	57.6	-1.2	-.36	1.5	.89	42.8	-.5	-.19	1.5	.94	15T	0	L312
L313	48.1	-10.7	-3.18	1.5	.83	48.1	4.9	1.94	1.2	.76	15L	X	L313
L315	59.7	.9	.27	1.5	.85	45.7	2.4	.96	1.2	.75	15T	0	L315
L321	60.4	1.6	.47	.8	.47	44.3	1.0	.40	1.3	.82	15T	0	L321
L324	54.1	-4.7	-1.39	1.9	1.10	40.0	-3.3	-1.30	2.3	1.45	15T	0	L324
L328	58.3	-.5	-.16	1.6	.90	42.1	-1.1	-.45	.7	.47	15T	0	L328
L331	54.6	-4.2	-1.25	1.1	.64	40.1	-3.1	-1.25	2.1	1.32	15T	0	L331
L336	59.7	.9	.25	2.2	1.26	44.1	.8	.32	1.9	1.19	15T	0	L336
L344	66.0	7.2	2.14	2.6	1.50	47.6	4.3	1.73	3.0	1.94	15C	0	L344
L345	54.4	-4.4	-1.31	2.0	1.16	39.4	-3.8	-1.53	1.5	.93	15T	0	L345
L352	58.0	-.9	-.25	.9	.53	43.1	-.1	-.05	1.4	.86	15C	0	L352
L360	56.9	-1.9	-.58	1.5	.83	40.3	-3.0	-1.19	1.5	.95	15T	0	L360
L366	53.0	-5.8	-1.73	1.3	.72	39.5	-3.8	-1.51	1.6	.99	15T	0	L366
L376	63.5	4.7	1.39	1.9	1.10	45.3	2.0	.80	1.3	.85	15T	0	L376
L382	60.3	1.5	.45	4.1	2.36	44.4	1.1	.45	1.6	1.02	15T	0	L382
L388	52.3	-6.5	-1.93	4.8	2.75	47.9	4.6	1.83	2.4	1.52	15T	X	L388
L390	64.0	5.2	1.54	1.2	.68	48.1	4.8	1.91	1.4	.88	15T	0	L390
L484	62.8	4.0	1.19	1.5	.84	47.2	3.9	1.57	1.8	1.16	15T	0	L484
L554	66.0	7.2	2.14	1.3	.75	45.6	2.3	.93	1.2	.75	15C	*	L554
L557	57.3	-1.5	-.46	1.7	.96	42.1	-1.1	-.45	1.9	1.23	15T	0	L557
L558	56.2	-2.6	-.78	1.1	.66	41.6	-1.7	-.66	1.2	.75	15T	0	L558
L559	63.1	4.3	1.29	1.1	.61	44.1	.8	.32	1.2	.74	15T	0	L559
L560	61.5	2.7	.81	2.4	1.35	45.2	1.9	.77	3.6	2.29	15T	0	L560
L562	55.9	-2.9	-.88	1.6	.91	42.7	-.6	-.24	1.6	1.04	15T	0	L562
L566	56.7	-2.1	-.64	1.0	.56	43.1	-.2	-.08	1.3	.82	15T	0	L566
L567	60.3	1.5	.45	1.3	.77	42.9	-.3	-.13	1.5	.98	15C	0	L567
L574	53.9	-4.9	-1.47	2.4	1.40	39.5	-3.8	-1.51	2.1	1.32	15T	0	L574
L576	64.5	5.7	1.68	2.1	1.20	44.0	.7	.29	2.6	1.64	15T	0	L576
L580	58.7	-.1	-.04	2.0	1.12	43.5	.2	.08	.5	.33	15T	0	L580
L581	60.0	1.1	.34	.8	.48	46.1	2.8	1.12	1.7	1.07	15Q	0	L581
L587	58.4	-.4	-.12	1.7	.99	39.5	-3.8	-1.51	.9	.58	15T	0	L587
L596	13.6	-45.2	-13.46	.7	.42	11.8	-31.5	-12.52	.9	.55	15T	#	L596
L597	55.9	-2.9	-.88	1.8	1.01	42.0	-1.3	-.50	1.3	.84	15T	0	L597
L599	57.9	-.9	-.28	1.4	.81	42.6	-.7	-.26	1.6	1.05	15T	0	L599
L600	62.7	3.9	1.17	1.8	1.03	45.3	2.0	.80	2.3	1.44	15T	0	L600
L604	54.7	-4.1	-1.24	3.9	2.23	58.9	15.7	6.24	4.7	2.97	15T	#	L604
L606	56.0	-2.8	-.84	1.1	.61	40.9	-2.3	-.93	1.0	.61	15T	0	L606
L618	14.7	-44.1	-13.15	1.0	.56	12.7	-30.6	-12.18	1.8	1.15	15T	#	L618
L622	66.8	7.9	2.37	2.6	1.47	68.8	25.5	10.17	1.0	.62	15T	#	L622
L626	56.9	-1.9	-.56	1.0	.59	41.7	-1.5	-.61	1.5	.95	15L	0	L626
L651	68.9	10.1	3.01	1.5	.85	51.3	8.1	3.21	1.2	.79	15T	*	L651
L670	65.5	6.7	2.00	14.1	8.05	48.2	4.9	1.96	1.1	.69	15T	0	L670
L676	59.9	1.1	.31	.9	.52	44.7	1.4	.56	2.5	1.58	15T	0	L676
L679	56.1	-2.7	-.80	.8	.48	41.9	-1.3	-.53	1.3	.85	15T	0	L679

GR. MEAN = 58.8 GRAMS GRAND MEAN = 43.3 GRAMS TEST DETERMINATIONS = 15
SD MEANS = 3.4 GRAMS SD OF MEANS = 2.5 GRAMS 113 LABS IN GRAND MEANS
AVERAGE SDR = 1.7 GRAMS AVERAGE SDR = 1.6 GRAMS
GR. MEAN = 576.8 MILLINEWTON GRAND MEAN = 424.3 MILLINEWTON

ANALYSIS 115-1 TABLE 1
TEARING STRENGTH, GRAMS
TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

	SAMPLE	WRITING				SAMPLE	PRINTING				TEST D. = 15		
LAB	E81	69 GRAMS PER SQUARE METER				K25	75 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L226B	53.3	-5.5	-1.63	2.5	1.41	48.3	5.0	1.99	2.4	1.52	15V	•	L226B
L242	57.9	-.9	-.26	.8	.46	42.2	-1.1	-.42	.9	.60	15U	•	L242
L250L	64.2	5.4	1.60	1.5	.88	47.4	4.2	1.66	1.5	.93	15H	•	L250L
L251	57.3	-1.5	-.44	1.7	.96	41.4	-1.9	-.74	1.4	.86	15K	•	L251
L291	58.1	-.7	-.20	1.4	.78	44.0	.7	.29	1.6	1.02	15B	•	L291
L396M	56.9	-1.9	-.56	1.4	.79	41.1	-2.2	-.88	1.1	.70	15V	•	L396M
L531	48.4	-10.4	-3.10	2.4	1.35	38.3	-5.0	-1.99	3.7	2.37	15E	•	L531
L654	55.7	-3.1	-.94	1.0	.60	42.3	-.9	-.37	.8	.52	15X	•	L654

TOTAL NUMBER OF LABORATORIES REPORTING = 129

Best values: E81 58 ± 4 grams
K25 43 ± 4 grams

The following laboratories were omitted from the grand means because of extreme test results: 207, 604, 662.

Data from the following laboratories appear to be off by a multiplicative factor: 596, 618.

Data from the following laboratories appeared to be off by a multiplicative factor: 226, 396M. Code 15V was assigned temporarily to put in a factor of 2.

Please see the diagram on the inside of the back cover of this report which shows how to distinguish between an Elmendorf tear tester with DEEP CUTOUT and an older model tester with NO CUTOUT.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T15-1 TABLE 2
TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

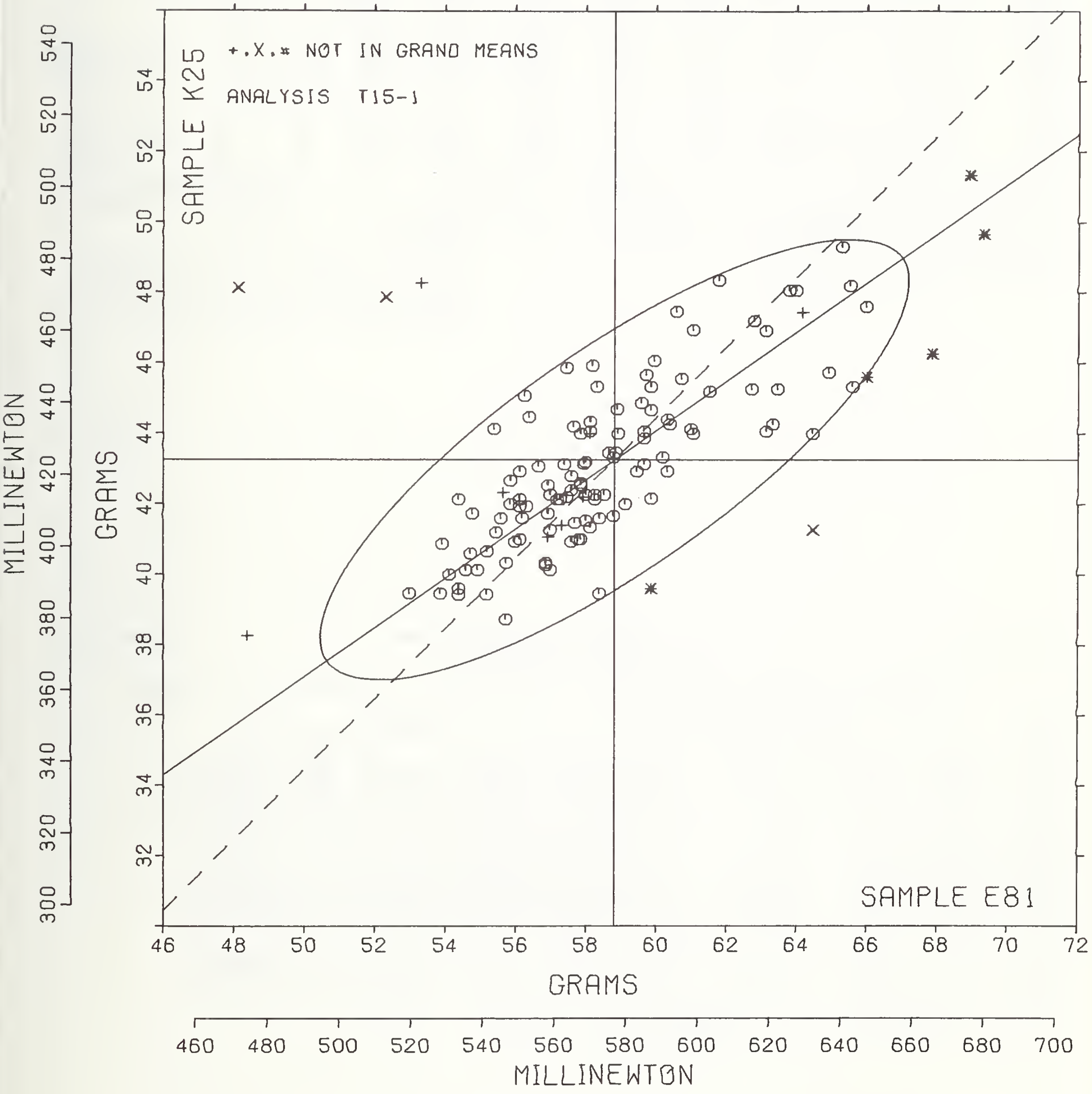
LAB		MEANS		COORDINATES		AVG			
CODE	F	E81	K25	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST	INSTRUMENT---CONDITIONS
L596	#	13.6	11.8	-55.1	.1	.49	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L618	#	14.7	12.7	-53.7	.2	.85	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L313	X	48.1	48.1	-6.0	10.1	.80	15L	TEARING STRENGTH,	STANDARD, LORENTZ-WETTRES
L531	•	48.4	38.3	-11.4	1.9	1.86	15E	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF,AMBIENT COND.
L207	#	50.6	101.5	26.7	52.4	.87	15R	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L388	X	52.3	47.9	-2.7	7.5	2.14	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L366	0	53.0	39.5	-6.9	.2	.85	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L226H	•	53.3	48.3	-1.6	7.2	1.46	15V	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L574	0	53.9	39.5	-6.2	-.3	1.36	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L281	0	53.9	40.9	-5.4	.8	.85	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L324	0	54.1	40.0	-5.7	.0	1.27	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L345	0	54.4	39.4	-5.8	-.6	1.04	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L268	0	54.4	42.1	-4.3	1.6	.61	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L191	0	54.4	39.6	-5.7	-.5	1.17	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L331	0	54.6	40.1	-5.2	-.2	.98	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L604	#	54.7	58.9	5.6	15.2	2.60	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L279	0	54.7	40.6	-4.9	.2	.73	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L254	0	54.8	41.7	-4.2	1.0	.70	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L211	0	54.9	40.1	-5.0	-.3	.39	15R	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L107	0	55.2	39.4	-5.2	-1.1	.73	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L237A	0	55.2	40.7	-4.5	-.1	.67	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L182A	0	55.4	44.1	-2.3	2.7	1.22	15A	TEARING STRENGTH,	STANDARD, AFFITA
L224	0	55.5	41.2	-3.9	.2	.84	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L277	0	55.6	41.6	-3.6	.5	.92	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L654	•	55.7	42.3	-3.1	1.0	.56	15X	TEARING STRENGTH,	STANDARD: GIVE INSTRUMENT MAKE,MODEL
L105	0	55.7	38.7	-5.1	-1.9	1.04	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L230	0	55.7	40.3	-4.2	-.6	1.43	15R	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L597	0	55.9	42.0	-3.1	.7	.92	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L562	0	55.9	42.7	-2.8	1.2	.98	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L606	0	56.0	40.9	-3.6	-.3	.61	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L679	0	56.1	41.9	-3.0	.4	.66	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L124	0	56.1	42.1	-2.8	.6	1.02	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L261	0	56.1	41.0	-3.5	-.3	1.19	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L238A	0	56.1	42.9	-2.4	1.3	.88	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L558	0	56.2	41.6	-3.1	.1	.71	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L264	0	56.3	45.1	-1.1	2.9	1.11	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L122	0	56.3	41.9	-2.8	.3	1.01	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L185	0	56.4	44.5	-1.3	2.4	.74	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L566	0	56.7	43.1	-1.9	1.1	.69	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L189	0	56.9	40.3	-3.3	-1.3	.70	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L360	0	56.9	40.3	-3.3	-1.3	.89	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L396M	•	56.9	41.1	-2.8	-.7	.75	15V	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L626	0	56.9	41.7	-2.4	-.2	.77	15L	TEARING STRENGTH,	STANDARD, LORENTZ-WETTRES
L241	0	56.9	42.5	-2.0	.5	1.29	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L103	0	57.0	41.3	-2.6	-.6	.65	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L141	0	57.0	40.1	-3.3	-1.5	.96	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L148	0	57.0	42.3	-2.1	.2	.80	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L190R	0	57.2	42.1	-2.0	-.0	.83	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L557	0	57.3	42.1	-1.9	-.1	1.10	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L251	•	57.3	41.4	-2.3	-.7	.91	15K	TEARING STRENGTH,	STANDARD, LORENTZ-WETTRES, 20 C, 65% RH
L237H	0	57.4	43.1	-1.2	.7	.57	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L173B	0	57.5	45.9	.4	2.9	.85	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L153	0	57.5	42.2	-1.7	-.1	.89	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L121	0	57.6	40.9	-2.3	-1.2	.97	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L312	0	57.6	42.8	-1.3	.3	.91	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L255	0	57.6	42.4	-1.5	-.0	.40	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L248	0	57.7	44.2	-.4	1.4	.96	15J	TEARING STRENGTH,	STANDARD, LORENTZ-WETTRES
L115	0	57.7	41.5	-1.9	-.8	.86	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L262	0	57.8	41.0	-2.1	-1.3	.90	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L183	0	57.9	41.0	-2.1	-1.3	.32	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L599	0	57.9	42.6	-1.2	-.0	.93	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L190C	0	57.9	44.0	-.4	1.1	.68	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L162	0	57.9	42.5	-1.2	-.1	.91	15T	TEARING STRENGTH,	STANDARD,THWING-ELMENDORF(SCALE TO 100)
L242	•	57.9	42.2	-1.3	-.4	.53	15U	TEARING STRENGTH,	STANDARD, AUSTRALIAN OPT. CO.
L352	0	58.0	43.1	-.8	.4	.70	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)

ANALYSIS T15-1 TABLE 2
TEARING STRENGTH, GRAMS
TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS B81	MEANS K25	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L166	O	58.0	43.2	-.7	.4	1.22	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257C	O	58.0	42.3	-1.2	-.4	.84	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L163	O	58.0	41.5	-1.7	-1.0	.74	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L291	•	58.1	44.0	-.1	1.0	.90	15B	TEARING STRENGTH, STANDARD, AFFITA, 20 C, 65% RH
L275	O	58.1	44.1	-.1	1.0	.90	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L128	O	58.1	44.3	.1	1.3	.79	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L228	O	58.1	41.3	-1.7	-1.2	1.25	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L236	O	58.2	45.9	1.0	2.5	1.17	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L328	O	58.3	42.1	-1.1	-.6	.69	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257A	O	58.3	42.3	-1.0	-.5	.77	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L244	O	58.3	45.3	.8	2.0	.61	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L587	O	58.4	39.5	-2.5	-2.9	.79	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L212	O	58.4	41.6	-1.3	-1.1	2.22	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L309	O	58.5	42.3	-.8	-.7	1.05	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L580	O	58.7	43.5	-.0	.3	.72	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L280	O	58.8	41.7	-.9	-1.3	1.63	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L167	O	58.8	43.3	.0	.1	.66	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L126	O	58.9	43.5	.2	.1	1.15	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L217	O	58.9	44.7	.9	1.1	.82	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L274	O	58.9	44.0	.5	.5	.71	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257B	O	59.1	42.0	-.5	-1.2	.89	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L232	O	59.5	42.9	.3	-.6	1.67	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L225	O	59.6	44.9	1.6	.9	.60	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L336	O	59.7	44.1	1.2	.2	1.22	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L290	O	59.7	43.1	.6	-.6	1.14	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L143	O	59.7	43.9	1.0	.0	2.56	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L315	O	59.7	45.7	2.1	1.4	.80	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L676	O	59.9	44.7	1.7	.5	1.05	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L213	O	59.9	45.3	2.0	1.1	.71	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L285	*	59.9	39.6	-1.2	-3.6	1.09	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L226C	O	59.9	42.2	.2	-1.5	.82	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L581	O	60.0	46.1	2.5	1.6	.78	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L299	O	60.2	43.3	1.2	-.7	.65	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L382	O	60.3	44.4	1.9	.1	1.69	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L567	O	60.3	42.9	1.1	-1.1	.87	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L321	O	60.4	44.3	1.9	-.1	.65	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L182T	O	60.6	47.5	3.9	2.4	.80	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L206	O	60.7	45.6	2.9	.8	.98	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L150	O	61.0	44.1	2.3	-.5	.76	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L145	O	61.1	46.9	3.9	1.7	1.39	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L195	O	61.1	44.0	2.3	-.7	.91	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L560	O	61.5	45.2	3.3	.0	1.82	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L249	O	61.8	48.4	5.4	2.5	1.32	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L600	O	62.7	45.3	4.4	-.6	1.23	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L484	O	62.8	47.2	5.5	.9	1.00	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L194	O	63.1	46.9	5.6	.5	.59	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L559	O	63.1	44.1	4.0	-1.8	.67	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L305	O	63.3	44.3	4.3	-1.8	1.33	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L376	O	63.5	45.3	5.0	-1.0	.98	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L139	O	63.8	48.1	6.8	1.1	.80	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L390	O	64.0	48.1	7.0	1.0	.78	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L250L	•	64.2	47.4	6.8	.3	.90	15H	TEARING STRENGTH, STANDARD, LHOMARGY, 20 C, 65% RH
L576	O	64.5	44.0	5.1	-2.6	1.42	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L288	X	64.5	41.3	3.5	-4.9	.97	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L273	O	64.9	45.7	6.4	-1.5	.62	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L223	O	65.3	49.3	8.8	1.2	.80	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L670	O	65.5	48.2	8.3	.2	4.37	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L278	O	65.6	45.3	6.7	-2.2	2.71	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L344	O	66.0	47.6	8.4	-.6	1.72	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L554	*	66.0	45.6	7.2	-2.2	.75	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L622	#	66.8	68.8	21.2	16.4	1.05	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L131	*	67.9	46.3	9.1	-2.7	1.74	15A	TEARING STRENGTH, STANDARD, AFFITA
L651	*	68.9	51.3	12.9	.8	.82	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L151	*	69.3	49.7	12.3	-.8	.97	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
GMEANS:		58.8	43.3			1.00		
		95% ELLIPSE:		10.0	3.1	WITH GAMMA = 34 DEGREES		

TEARING STRENGTH, DEEP CUTOUT

SAMPLE E81 = 58.8 GRAMS SAMPLE K25 = 43.3 GRAMS
SAMPLE E81 = 577 MILLINEWTON SAMPLE K25 = 424 MILLINEWTON



REPORT NO. 56S TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1978

ANALYSIS T17-1 TABLE 1

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, THWING-ELMENDORF WITHOUT DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE K19 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE K35 MEAN	PRINTING 105 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L122	143.1	-4.1	-.41	8.2	1.23	116.0	-4.1	-.46	4.9	1.18	17N	0	L122
L148	145.9	-1.3	-.13	3.7	.55	119.9	-.3	-.03	3.4	.82	17N	0	L148
L231	151.3	4.2	.42	6.2	.93	115.6	-4.5	-.50	1.8	.43	17N	0	L231
L234	156.3	9.1	.92	5.8	.86	131.7	11.6	1.28	4.7	1.13	17N	0	L234
L267	161.3	14.2	1.43	6.6	.99	135.8	15.7	1.73	7.0	1.69	17N	0	L267
L269	153.6	6.4	.65	9.5	1.43	128.7	8.6	.95	7.2	1.72	17N	0	L269
L301A	149.2	2.0	.21	7.4	1.12	122.9	2.7	.30	3.2	.77	17N	0	L301A
L301B	146.7	-.5	-.05	5.4	.81	119.5	-.6	-.07	2.3	.54	17N	0	L301B
L308	156.3	9.1	.92	10.3	1.54	129.1	8.9	.99	6.7	1.61	17N	0	L308
L326	148.9	1.8	.18	6.5	.97	115.7	-4.5	-.49	3.3	.79	17N	0	L326
L339	124.5	-22.6	-2.29	6.0	.90	106.8	-13.3	-1.47	3.4	.81	17N	0	L339
L372	133.2	-14.0	-1.41	4.6	.70	109.6	-10.5	-1.16	3.1	.75	17N	0	L372
L393	142.9	-4.2	-.43	6.5	.97	110.4	-9.7	-1.07	3.0	.73	17N	0	L393

GR. MEAN = 147.2 GRAMS GRAND MEAN = 120.1 GRAMS TEST DETERMINATIONS = 15

SD MEANS = 9.9 GRAMS SD OF MEANS = 9.0 GRAMS 13 LABS IN GRAND MEANS

AVERAGE SDR = 6.7 GRAMS AVERAGE SDR = 4.2 GRAMS

GR. MEAN =1443.2 MILLINEWTON GRAND MEAN =1178.1 MILLINEWTON

TOTAL NUMBER OF LABORATORIES REPORTING = 13

Best values: K19 147 ± 15 grams
K35 120 ± 14 grams

Please see the diagram on the inside of the back cover of this report which shows how to distinguish between an Elmendorf tear tester with DEEP CUTOUT and an older model tester with NOT CUTOUT.

REPORT NO. 56S TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1978

ANALYSIS T17-1 TABLE 2

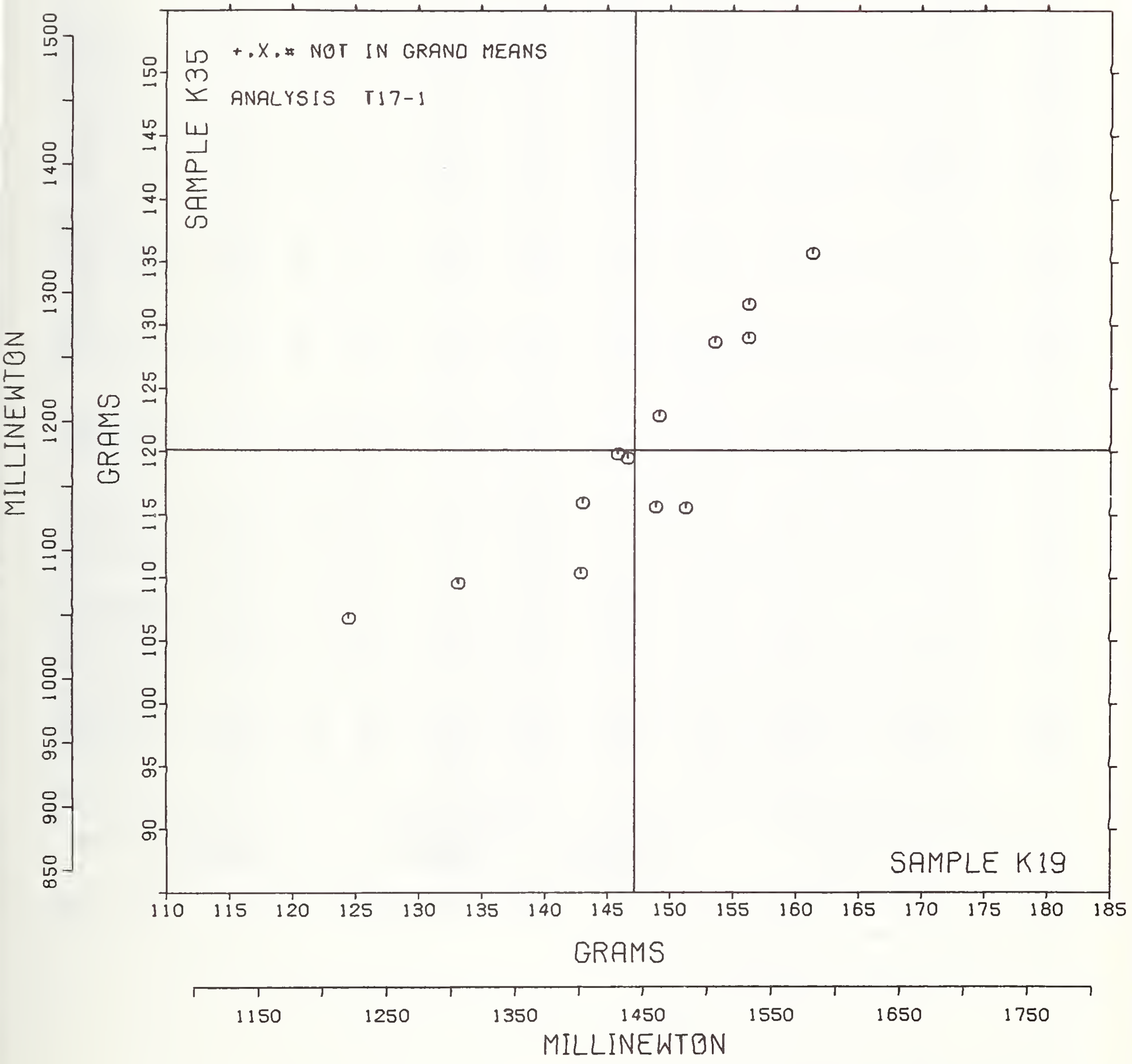
TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, THWING-ELMENDORF WITHOUT DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS K19	K35	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	0	124.5	106.8	-25.7	5.3	.86	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L372	0	133.2	109.6	-17.4	1.6	.73	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L393	0	142.9	110.4	-9.7	-4.4	.85	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L122	0	143.1	116.0	-5.8	-.3	1.21	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L148	0	145.9	119.9	-1.1	.7	.69	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L301B	0	146.7	119.5	-.8	-.1	.68	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L326	0	148.9	115.7	-1.7	-4.5	.88	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L301A	0	149.2	122.9	3.3	.7	.94	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L231	0	151.3	115.6	.1	-6.2	.68	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L269	0	153.6	128.7	10.5	2.1	1.57	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L308	0	156.3	129.1	12.7	.5	1.57	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L234	0	156.3	131.7	14.5	2.5	1.00	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L267	0	161.3	135.8	21.0	2.1	1.34	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
GMEANS:		147.2	120.1			1.00		
		95% ELLIPSE:		38.4	9.5	WITH GAMMA = 42 DEGREES		

TEARING STRENGTH, NO CUTOUT

SAMPLE K19 = 147. GRAMS
SAMPLE K19 = 1443 MILLINEWTON
SAMPLE K35 = 120. GRAMS
SAMPLE K35 = 1178 MILLINEWTON



ANALYSIS T19-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

TAPPI STANDARDS T404 OS-76 AND T494 OS-70, TENSILE BREAKING STRENGTH, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE K31 MEAN	PRINTING 105 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE K33 MEAN	KRAFT 123 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 20 VAR	P	LAB
L107	8.53	-.15	-.45	.54	1.18	9.71	.37	.96	.68	1.25	19A	0	L107
L122	8.80	.12	.35	.41	.90	9.37	.03	.07	.52	.95	19A	0	L122
L126	8.65	-.03	-.09	.32	.71	9.47	.12	.33	.45	.83	19A	0	L126
L151	8.68	-.00	-.00	.61	1.34	9.31	-.03	-.08	.65	1.18	19A	0	L151
L153	8.84	.16	.48	.44	.97	9.68	.33	.87	.41	.75	19P	0	L153
L167	9.98	1.30	3.88	.48	1.06	10.65	1.31	3.44	.63	1.15	19G	X	L167
L182I	8.53	-.14	-.43	.41	.90	9.21	-.13	-.34	.52	.95	19D	0	L182I
L182L	8.38	-.30	-.90	.38	.83	9.28	-.07	-.17	.50	.92	19T	0	L182L
L207	8.72	.04	.13	.42	.92	9.50	.16	.42	.66	1.20	19A	0	L207
L217P	8.22	-.45	-1.35	.42	.92	9.19	-.15	-.40	.49	.90	19P	0	L217P
L224	8.72	.05	.14	.43	.95	9.61	.26	.69	.51	.93	19A	0	L224
L225	8.82	.14	.41	.39	.85	9.39	.05	.13	.54	.98	19P	0	L225
L234L	8.77	.09	.27	.40	.88	9.21	-.13	-.35	.58	1.06	19P	0	L234L
L237A	8.13	-.55	-1.62	.52	1.14	7.55	-1.79	-4.69	.72	1.31	19Q	#	L237A
L237B	9.01	.33	.98	.51	1.13	9.34	.00	.00	.65	1.18	19A	0	L237B
L238A	8.53	-.15	-.44	.48	1.05	9.19	-.15	-.39	.70	1.28	19T	0	L238A
L257A	8.79	.12	.35	.30	.66	9.39	.05	.13	.45	.83	19P	0	L257A
L257C	8.58	-.10	-.30	.49	1.09	9.48	.14	.35	.38	.69	19P	0	L257C
L264A	8.61	-.07	-.21	.51	1.11	9.42	.08	.21	.63	1.15	19A	0	L264A
L264P	8.88	.21	.61	.41	.90	9.78	.44	1.15	.57	1.04	19P	0	L264P
L265	8.95	.27	.80	.54	1.19	9.10	-.25	-.65	.64	1.18	19A	0	L265
L267	8.43	-.25	-.74	.50	1.11	9.65	.31	.80	.45	.83	19A	0	L267
L268A	8.97	.29	.86	.38	.83	9.17	-.18	-.46	.45	.82	19A	0	L268A
L268P	8.04	-.64	-1.91	.45	.99	9.57	.23	.61	.56	1.02	19P	0	L268P
L273	9.12	.44	1.31	.46	1.02	9.37	.03	.07	.66	1.20	19P	0	L273
L274	8.62	-.06	-.18	.24	.52	8.47	-.88	-2.30	.25	.46	19P	0	L274
L280	8.09	-.59	-1.74	.43	.94	8.64	-.70	-1.84	.53	.97	19G	0	L280
L281	9.39	.72	2.13	.31	.68	9.47	.12	.32	.52	.94	19G	0	L281
L305	8.73	.06	.17	.46	1.01	9.28	-.07	-.18	.37	.69	19V	0	L305
L312	8.62	-.06	-.17	.53	1.17	9.51	.17	.44	.45	.82	19D	0	L312
L318	8.08	-.59	-1.77	.38	.84	8.64	-.70	-1.83	.42	.77	19G	0	L318
L324	8.60	-.07	-.22	.44	.97	9.19	-.15	-.39	.56	1.02	19A	0	L324
L336	8.76	.08	.25	.34	.74	9.52	.18	.48	.48	.87	19G	0	L336
L356	8.91	.24	.70	.36	.79	9.72	.38	1.00	.64	1.17	19P	0	L356
L366	8.45	-.23	-.69	.73	1.59	9.69	.34	.90	.77	1.41	19P	0	L366
L562	8.94	.27	.79	.69	1.52	10.03	.69	1.80	.63	1.15	19P	0	L562
L568	8.21	-.47	-1.38	.36	.79	8.92	-.43	-1.12	.36	.67	19P	0	L568
L576	8.50	-.18	-.54	.41	.91	9.19	-.15	-.40	.50	.92	19A	0	L576
L580	9.16	.48	1.44	.42	.93	8.69	-.65	-1.70	.79	1.45	19G	*	L580
L581	9.18	.50	1.48	.58	1.28	9.94	.59	1.56	.70	1.28	19A	0	L581
L582	7.90	-.78	-2.32	.34	.74	8.25	-1.10	-2.87	.70	1.28	19A	*	L582
L604	1.51	-7.17	-21.34	.15	.32	1.72	-7.62	-19.98	.08	.15	19A	#	L604
L606	8.85	.18	.53	.68	1.49	9.41	.07	.18	.56	1.02	19P	0	L606
L622	8.60	-.08	-.22	.55	1.21	9.67	.32	.85	.57	1.05	190	0	L622
L650	9.31	.63	1.88	.51	1.11	9.77	.43	1.13	.91	1.67	19G	0	L650
L676	7.44	-1.23	-3.67	1.08	2.37	7.23	-2.11	-5.54	1.03	1.89	19A	#	L676

GR. MEAN = 8.68 KILONEWTON/M GRAND MEAN = 9.34 KILONEWTON/M TEST DETERMINATIONS = 20

SD MEANS = .34 KILONEWTON/M SD OF MEANS = .38 KILONEWTON/M 42 LABS IN GRAND MEANS

AVERAGE SDR = .45 KILONEWTON/M AVERAGE SDR = .55 KILONEWTON/M

GR. MEAN = 49.56 LB/INCH GRAND MEAN = 53.36 LB/INCH

LAB CODE	K31 MEAN	DEV	N.DEV	SDR	R.SDR	K33 MEAN	DEV	N.DEV	SDR	R.SDR	VAR	P	LAB
L250I	7.84	-.84	-2.50	.27	.60	8.29	-1.06	-2.77	.33	.60	19L	•	L250I
L251	7.69	-.98	-2.93	.49	1.08	8.37	-.98	-2.56	.66	1.20	19I	•	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 48

Best values: K31 8.7 ± 0.6 kilonewton per meter
K33 9.4 ± 0.7 kilonewton per meter

The following laboratories were omitted from the grand means because of extreme test results: 237A, 676.

Data from the following laboratories appear to be off by a multiplicative factor: 604.

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ANALYSIS T19-1 TABLE 2

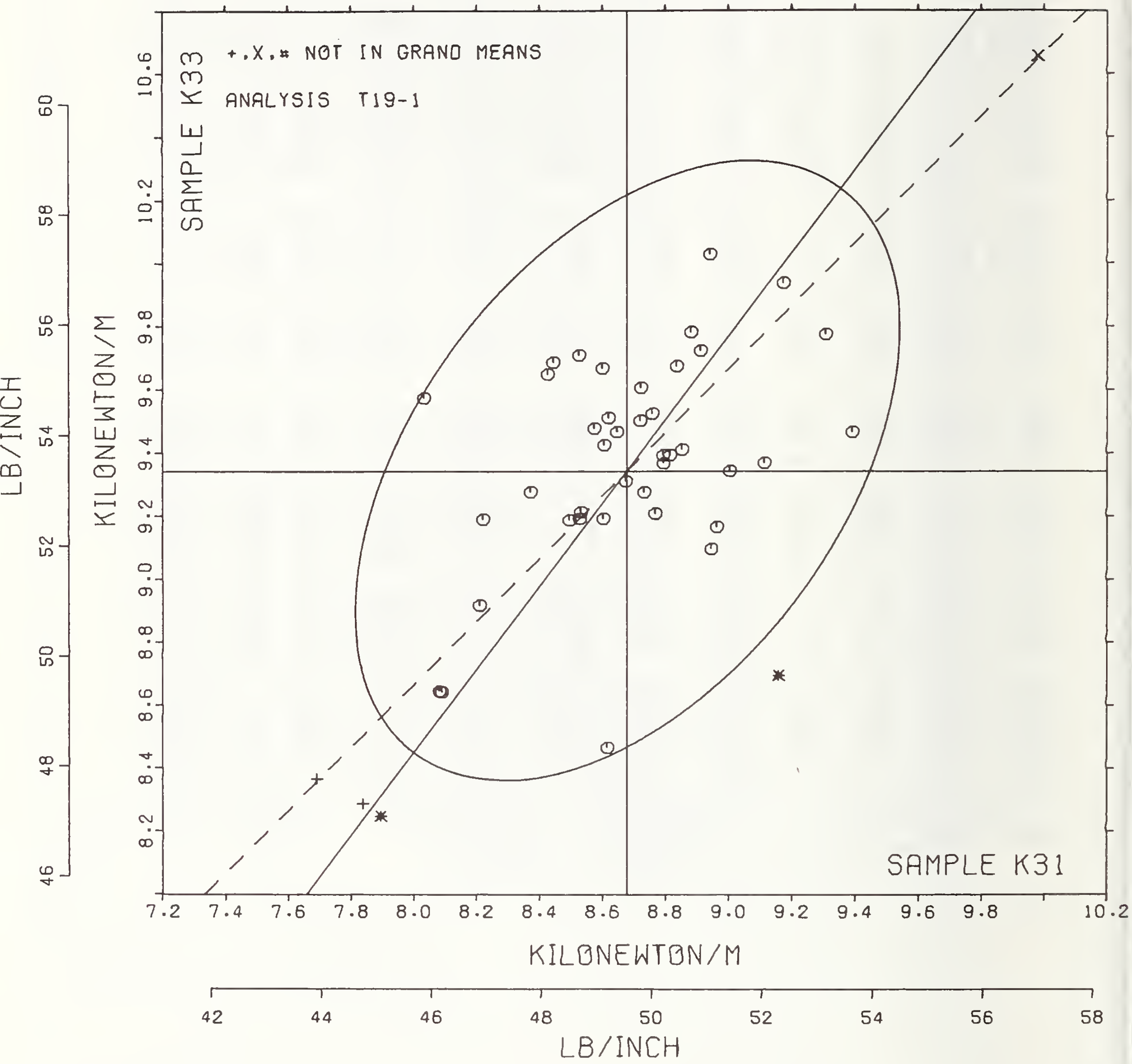
TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

TAPPI STANDARDS T404 OS-76 AND T494 OS-70, TENSILE BREAKING STRENGTH, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS K31	MEANS K33	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L604	#	1.51	1.72	-10.40	1.11	.24	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L676	#	7.44	7.23	-2.43	-.29	2.13	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L251	+	7.69	8.37	-1.37	.19	1.14	19I	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20C, 65% RH
L250I	+	7.84	8.29	-1.35	.03	.60	19L	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20 C, 65% RH
L582	*	7.90	8.25	-1.34	-.04	1.01	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L268P	O	8.04	9.57	-.20	.65	1.01	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L318	O	8.08	8.64	-.91	.05	.80	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L280	O	8.09	8.64	-.91	.04	.95	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L237A	#	8.13	7.55	-1.76	-.65	1.23	19Q	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L568	O	8.21	8.92	-.62	.11	.73	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L217P	O	8.22	9.19	-.40	.27	.91	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L182L	O	8.38	9.28	-.23	.20	.87	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L267	O	8.43	9.65	.09	.38	.97	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L366	O	8.45	9.69	.13	.39	1.50	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L576	O	8.50	9.19	-.23	.05	.91	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L107	O	8.53	9.71	.20	.34	1.21	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L238A	O	8.53	9.19	-.21	.03	1.17	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L182I	O	8.53	9.21	-.19	.04	.92	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L257C	O	8.58	9.48	.05	.16	.89	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L622	O	8.60	9.67	.21	.26	1.13	19O	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L324	O	8.60	9.19	-.16	-.03	.99	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L264A	O	8.61	9.42	.02	.11	1.13	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L274	O	8.62	8.47	-.74	-.48	.49	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L312	O	8.62	9.51	.10	.15	.99	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L126	O	8.65	9.47	.08	.10	.77	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L151	O	8.68	9.31	-.03	-.02	1.26	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L207	O	8.72	9.50	.15	.06	1.06	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L224	O	8.72	9.61	.24	.12	.94	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L305	O	8.73	9.28	-.02	-.09	.85	19V	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L336	O	8.76	9.52	.20	.04	.81	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L234L	O	8.77	9.21	-.05	-.15	.97	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L257A	O	8.79	9.39	.11	-.06	.75	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L122	O	8.80	9.37	.09	-.08	.93	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L225	O	8.82	9.39	.12	-.08	.92	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L153	O	8.84	9.68	.36	.07	.86	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L606	O	8.85	9.41	.16	-.10	1.25	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L264P	O	8.88	9.78	.47	.10	.97	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L356	O	8.91	9.72	.45	.04	.98	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L562	O	8.94	10.03	.71	.20	1.34	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L265	O	8.95	9.10	-.03	-.36	1.18	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L268A	O	8.97	9.17	.03	-.34	.83	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L237B	O	9.01	9.34	.20	-.26	1.15	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L273	O	9.12	9.37	.29	-.33	1.11	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L580	*	9.16	8.69	-.22	-.78	1.19	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L581	O	9.18	9.94	.77	-.04	1.28	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L650	O	9.31	9.77	.73	-.24	1.39	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L281	O	9.39	9.47	.53	-.50	.81	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L167	X	9.98	10.65	1.83	-.25	1.10	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
GMEANS:		8.68	9.34			1.00		
		95% ELLIPSE:		1.12	.67	WITH GAMMA = 52 DEGREES		

TENSILE STRENGTH, PACKAGING PAPERS

SAMPLE K31 = 8.7 KILONEWTON/M SAMPLE K33 = 9.3 KILONEWTON/M
SAMPLE K31 = 49.6 LB/INCH SAMPLE K33 = 53.4 LB/INCH



ANALYSIS T20-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D.= 20		
LAB	J08	85 GRAMS PER SQUARE METER				J06	149 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	6.41	.14	.37	.47	1.34	5.55	.15	.49	.24	1.04	20A	0	L105
L122	6.17	-.09	-.24	.34	.96	5.30	-.10	-.34	.22	.97	20A	0	L122
L124C	5.92	-.35	-.89	.51	1.43	5.13	-.27	-.89	.26	1.12	20A	0	L124C
L125	6.37	.10	.25	.46	1.31	5.50	.10	.32	.27	1.16	20C	0	L125
L131	6.44	.17	.44	.43	1.22	5.22	-.18	-.58	.37	1.63	20B	0	L131
L141T	6.08	-.19	-.49	.24	.69	5.21	-.19	-.61	.19	.81	20A	0	L141T
L143	7.20	.93	2.38	.49	1.39	6.07	.67	2.21	.26	1.14	20B	0	L143
L148	6.94	.67	1.73	.30	.85	5.88	.48	1.59	.26	1.14	20A	0	L148
L163	6.39	.12	.32	.32	.89	5.43	.03	.10	.15	.64	20D	0	L163
L167	6.83	.56	1.44	.42	1.19	5.93	.53	1.76	.23	1.02	20G	0	L167
L185	6.23	-.04	-.11	.33	.94	5.28	-.12	-.39	.35	1.51	20C	0	L185
L190R	6.46	.19	.50	.34	.97	5.37	-.04	-.11	.26	1.12	20A	0	L190R
L194	5.86	-.40	-1.04	.23	.65	4.95	-.45	-1.49	.17	.73	20A	0	L194
L223B	6.33	.06	.16	.34	.95	5.30	-.10	-.33	.16	.69	20A	0	L223B
L226C	5.85	-.42	-1.08	.53	1.51	5.54	.14	.45	.26	1.11	20C	0	L226C
L230	6.19	-.07	-.19	.31	.87	5.31	-.09	-.29	.14	.61	200	0	L230
L255	6.07	-.20	-.51	.19	.54	5.20	-.20	-.65	.16	.71	20A	0	L255
L260	6.08	-.19	-.49	.17	.47	5.81	.41	1.35	.21	.90	20A	*	L260
L261	6.01	-.25	-.65	.70	1.98	5.44	.04	.12	.21	.92	20A	0	L261
L278	5.25	-1.02	-2.63	.21	.61	6.34	.94	3.07	.24	1.04	20A	X	L278
L291	5.30	-.96	-2.48	.36	1.00	5.04	-.36	-1.17	.35	1.50	20A	*	L291
L309	6.54	.27	.70	.39	1.11	5.64	.24	.78	.26	1.13	20E	0	L309
L315	6.35	.09	.22	.21	.60	5.24	-.16	-.54	.23	1.02	20A	0	L315
L318	5.80	-.47	-1.20	.29	.83	4.97	-.43	-1.41	.18	.78	20G	0	L318
L325	6.13	-.14	-.35	.34	.97	5.10	-.30	-.98	.23	1.02	20E	0	L325
L328	6.13	-.14	-.36	.20	.57	5.27	-.13	-.44	.13	.57	20A	0	L328
L331	6.93	.67	1.71	.26	.73	6.01	.61	2.00	.23	1.01	20A	0	L331
L333	6.37	.10	.25	.43	1.21	5.36	-.04	-.14	.30	1.29	20A	0	L333
L344	6.37	.11	.27	.32	.91	5.63	.23	.77	.22	.94	20A	0	L344
L356	6.19	-.08	-.20	.23	.64	5.34	-.06	-.21	.18	.77	20A	0	L356
L360	4.89	-1.38	-3.55	.31	.89	5.93	.53	1.75	.36	1.55	20B	X	L360
L390	6.46	.19	.49	.37	1.05	5.56	.15	.51	.30	1.31	20A	0	L390
L531	3.06	-3.21	-8.24	.26	.72	2.91	-2.49	-8.16	.27	1.17	20A	#	L531
L557	5.67	-.59	-1.53	.61	1.72	5.21	-.19	-.63	.18	.78	20A	0	L557
L558	3.55	-2.72	-7.00	.29	.81	3.10	-2.30	-7.55	.17	.73	20A	#	L558
L559	6.55	.29	.73	.20	.58	5.68	.28	.92	.17	.73	20A	0	L559
L560	5.73	-.53	-1.37	.43	1.21	4.92	-.48	-1.56	.29	1.25	20A	0	L560
L563A	5.96	-.30	-.78	.36	1.02	4.91	-.49	-1.60	.37	1.61	20A	0	L563A
L567	10.11	3.84	9.88	.36	1.01	8.66	3.26	10.70	.24	1.06	20A	#	L567
L574	6.75	.49	1.25	.19	.54	5.70	.30	.97	.20	.88	20A	0	L574
L592	6.56	.29	.75	.24	.67	5.41	.01	.02	.19	.84	20A	0	L592
L616	4.31	-1.96	-5.03	.44	1.23	3.28	-2.12	-6.97	.28	1.23	20D	#	L616
L618	NO DATA REPORTED FOR SAMPLE J08					5.15	-.25	-.81	.38	1.65	20A	M	L618

GR. MEAN = 6.27 KILONEWTON/M GRAND MEAN = 5.40 KILONEWTON/M TEST DETERMINATIONS = 20
SD MEANS = .39 KILONEWTON/M SD OF MEANS = .30 KILONEWTON/M 36 LABS IN GRAND MEANS
AVERAGE SDR = .35 KILONEWTON/M AVERAGE SDR = .23 KILONEWTON/M
GR. MEAN =21.142 LB/15 MM GRAND MEAN =18.213 LB/15 MM

L139	5.84	-.43	-1.10	.58	1.62	5.20	-.20	-.65	.19	.84	20H	+	L139
L250I	5.54	-.73	-1.87	.15	.41	4.69	-.71	-2.34	.13	.57	20L	+	L250I
L251	5.26	-1.01	-2.59	.53	1.49	4.67	-.73	-2.41	.31	1.35	20I	•	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 46

Best values: J08 6.3 ± 0.6 kilonewton per meter
J06 5.4 ± 0.5 kilonewton per meter

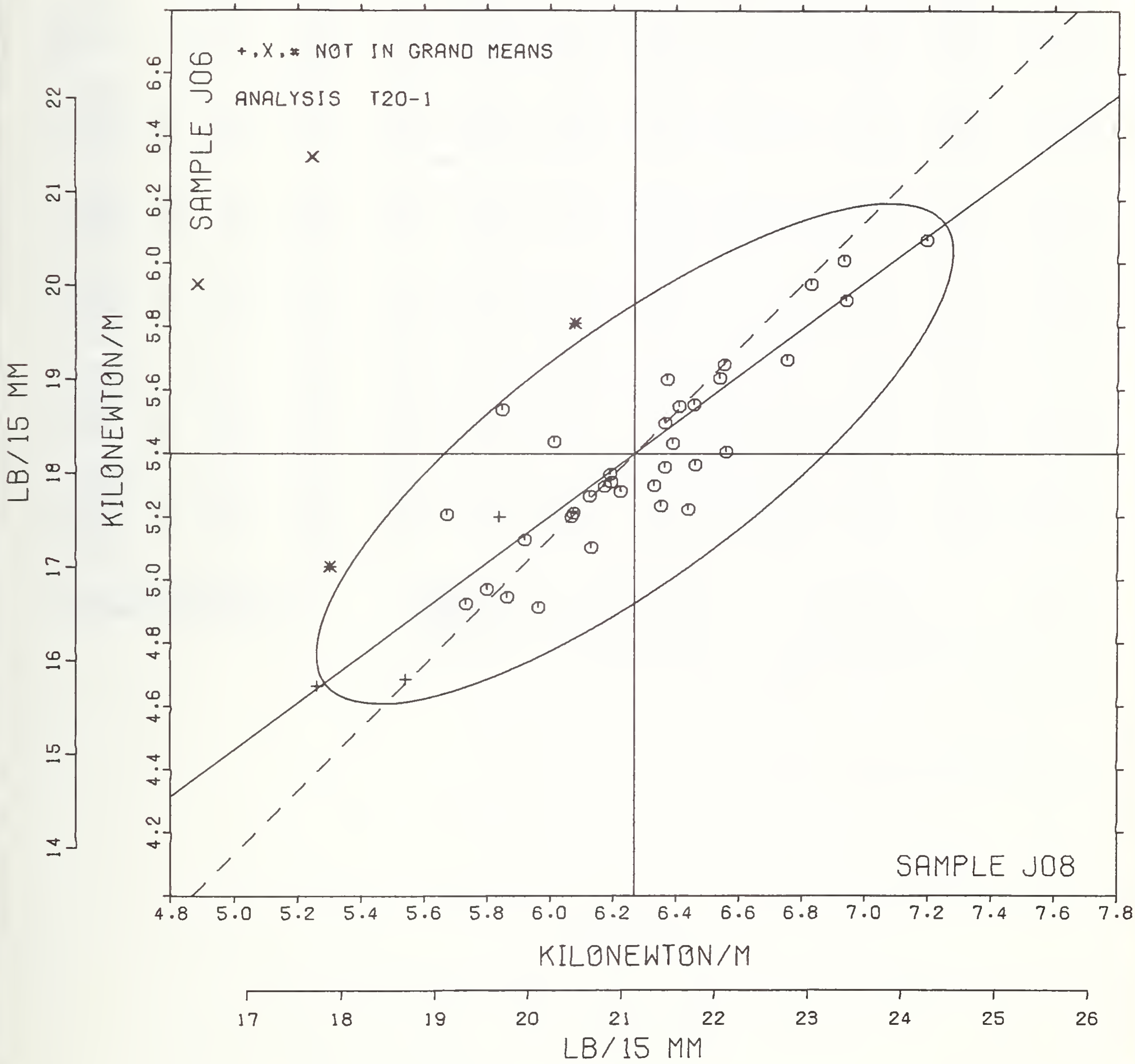
Data from the following laboratories appear to be off by a multiplicative factor: 531, 558, 567, 616.

ANALYSIS T20-1 TABLE 2
TENSILE BREAKING STRENGTH, KILONEWTONS PER METER
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB		MEANS		COORDINATES		AVG		
CODE	F	J08	J06	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L618	M		5.15			1.65	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE
L531	#	3.06	2.91	-4.05	-.10	.95	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L558	#	3.55	3.10	-3.56	-.23	.77	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L616	#	4.31	3.28	-2.84	-.55	1.23	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L360	X	4.89	5.93	-.80	1.25	1.22	20H	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L278	X	5.25	6.34	-.27	1.36	.82	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L251	•	5.26	4.67	-1.25	.01	1.42	20I	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L291	*	5.30	5.04	-.99	.29	1.25	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L250I	•	5.54	4.69	-1.01	-.14	.49	20L	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L557	O	5.67	5.21	-.59	.20	1.25	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L560	O	5.73	4.92	-.71	-.07	1.23	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L318	O	5.80	4.97	-.63	-.07	.80	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L139	•	5.84	5.20	-.46	.09	1.23	20H	TENSILE STRENGTH, PRINTING PAPER, CRE, SHORT TEST SPAN
L226C	O	5.85	5.54	-.25	.36	1.31	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L194	O	5.86	4.95	-.59	-.13	.69	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L124C	O	5.92	5.13	-.44	-.01	1.27	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L563A	O	5.96	4.91	-.53	-.21	1.31	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L261	O	6.01	5.44	-.18	.18	1.45	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L255	O	6.07	5.20	-.28	-.04	.62	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L141T	O	6.08	5.21	-.27	-.04	.75	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L260	*	6.08	5.81	.09	.44	.69	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L328	O	6.13	5.27	-.19	-.02	.57	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L325	O	6.13	5.10	-.29	-.16	.99	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L122	O	6.17	5.30	-.14	-.03	.97	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L356	O	6.19	5.34	-.10	-.01	.71	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L230	O	6.19	5.31	-.11	-.03	.74	20O	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L185	O	6.23	5.28	-.11	-.07	1.22	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L223H	O	6.33	5.30	-.01	-.12	.82	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L315	O	6.35	5.24	-.03	-.18	.81	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L333	O	6.37	5.36	.05	-.09	1.25	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L125	O	6.37	5.50	.14	.02	1.23	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L344	O	6.37	5.63	.22	.13	.93	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L163	O	6.39	5.43	.12	-.05	.77	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L105	O	6.41	5.55	.20	.04	1.19	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L131	O	6.44	5.22	.03	-.24	1.42	20H	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L390	O	6.46	5.56	.24	.01	1.18	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L190R	O	6.46	5.37	.13	-.14	1.05	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L309	O	6.54	5.64	.36	.03	1.12	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L559	O	6.55	5.68	.40	.06	.65	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L592	O	6.56	5.41	.24	-.17	.75	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L574	O	6.75	5.70	.57	-.05	.71	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L167	O	6.83	5.93	.77	.10	1.10	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L331	O	6.93	6.01	.90	.10	.87	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L148	O	6.94	5.88	.83	-.01	.99	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L143	O	7.20	6.07	1.15	-.01	1.27	20B	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L567	#	10.11	8.66	5.03	.34	1.04	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
GMEANS:		6.27	5.40			1.00		
		95% ELLIPSE:		1.22	.39	WITH GAMMA = 36 DEGREES		

TENSILE STRENGTH, CRE TYPE

SAMPLE J08 = 6.27 KILONEWTON/M SAMPLE J06 = 5.40 KILONEWTON/M
SAMPLE J08 = 21.1 LB/15 MM SAMPLE J06 = 18.2 LB/15 MM



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ANALYSIS T20-2 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T404 OS-76, TENSILE BREAKING STRENGTH OF PAPER AND PAPERBOARD (PENDULUM-TYPE TESTER)

	SAMPLE		PRINTING			SAMPLE		PRINTING			TEST D. = 20		
LAB	J08	85 GRAMS PER SQUARE METER				J06	149 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L103	6.55	.13	.40	.34	.90	5.64	.13	.45	.25	.96	20R	0	L103
L108	6.54	.11	.35	.41	1.09	5.77	.26	.88	.17	.66	20P	0	L108
L121	6.50	.07	.22	.52	1.37	5.72	.22	.73	.22	.85	20P	0	L121
L124P	6.41	-.01	-.03	.32	.85	5.54	.03	.11	.15	.57	20P	0	L124P
L128	6.40	-.02	-.07	.34	.90	5.52	.01	.04	.27	1.04	20T	0	L128
L148	6.34	-.09	-.27	.22	.57	5.34	-.17	-.57	.25	.93	20P	0	L148
L162	6.54	.12	.36	.25	.65	5.60	.09	.31	.21	.78	20*	0	L162
L182L	6.08	-.34	-1.06	.20	.52	5.20	-.31	-1.04	.23	.87	20T	0	L182L
L189	6.53	.10	.32	.27	.72	5.69	.19	.63	.23	.86	20R	0	L189
L191P	6.74	.32	.98	.33	.87	5.78	.28	.93	.20	.77	20P	0	L191P
L195	6.98	.55	1.71	.61	1.60	5.70	.19	.65	.33	1.27	20R	0	L195
L212	6.11	-.31	-.97	.28	.74	5.15	-.36	-1.21	.26	.99	20R	0	L212
L213	6.24	-.18	-.56	.31	.83	5.16	-.35	-1.18	.38	1.45	20T	0	L213
L218	6.20	-.22	-.69	.16	.41	5.38	-.13	-.42	.12	.44	20P	0	L218
L241	1.92	-4.50	-14.00	.11	.29	1.68	-3.82	-12.85	.06	.21	20R	#	L241
L242	6.00	-.42	-1.32	.55	1.45	5.28	-.23	-.76	.19	.71	20Y	0	L242
L249	6.32	-.10	-.32	.53	1.38	5.40	-.10	-.34	.32	1.21	20P	0	L249
L262	6.90	.48	1.48	.40	1.04	6.07	.57	1.90	.37	1.41	20R	0	L262
L274	6.20	-.23	-.71	.26	.68	4.96	-.54	-1.83	.20	.75	20P	0	L274
L275	6.16	-.27	-.83	.40	1.05	5.13	-.38	-1.27	.35	1.33	20R	0	L275
L279P	6.50	.08	.25	.57	1.50	5.57	.06	.21	.68	2.58	20P	0	L279P
L285	4.78	-1.64	-5.12	.19	.49	4.68	-.83	-2.79	.17	.66	20P	#	L285
L290	6.22	-.21	-.65	.23	.61	5.51	.01	.03	.34	1.31	20P	0	L290
L313	6.35	-.08	-.24	.27	.70	5.25	-.25	-.85	.24	.93	20T	0	L313
L321	5.30	-1.13	-3.51	.30	.78	6.14	.64	2.14	.29	1.10	20Q	X	L321
L330	6.76	.34	1.06	.54	1.41	5.93	.42	1.42	.23	.86	20P	0	L330
L356	6.69	.27	.84	.22	.59	5.58	.08	.26	.24	.91	20P	0	L356
L376	5.91	-.51	-1.60	.57	1.49	5.29	-.22	-.74	.20	.75	20P	0	L376
L393	6.77	.35	1.08	.38	1.01	5.81	.31	1.03	.17	.64	20P	0	L393
L484	5.64	-.78	-2.43	.35	.93	4.96	-.55	-1.84	.27	1.05	20U	0	L484
L554	6.43	.00	.01	.36	.93	5.51	.00	.00	.18	.70	20P	0	L554
L556	6.10	-.33	-1.02	.63	1.65	5.72	.21	.71	.36	1.36	20P	0	L556
L563P	6.74	.32	.98	.52	1.36	5.82	.32	1.06	.20	.75	20P	0	L563P
L585	7.16	.74	2.29	.29	.76	5.66	.16	.53	.32	1.22	20V	*	L585
L599	6.43	.01	.03	.41	1.08	5.04	-.46	-1.55	.29	1.09	20V	0	L599
L626	6.55	.12	.38	.42	1.12	6.01	.50	1.68	.32	1.22	20T	0	L626

GR. MEAN = 6.42 KILONEWTON/M GRAND MEAN = 5.51 KILONEWTON/M TEST DETERMINATIONS = 20
SD MEANS = .32 KILONEWTON/M SD OF MEANS = .30 KILONEWTON/M 33 LABS IN GRAND MEANS
AVERAGE SDR = .38 KILONEWTON/M AVERAGE SDR = .26 KILONEWTON/M
GR. MEAN = 21.67 LB/15 MM GRAND MEAN = 18.57 LB/15 MM
TOTAL NUMBER OF LABORATORIES REPORTING = 36

Best values: J08 6.4 ± 0.5 kilonewton per meter
J06 5.5 ± 0.5 kilonewton per meter

The following laboratories were omitted from the grand means because of extreme test results: 285.

Data from the following laboratories appear to be off by a multiplicative factor: 241.

ANALYSIS T20-2 TABLE 2

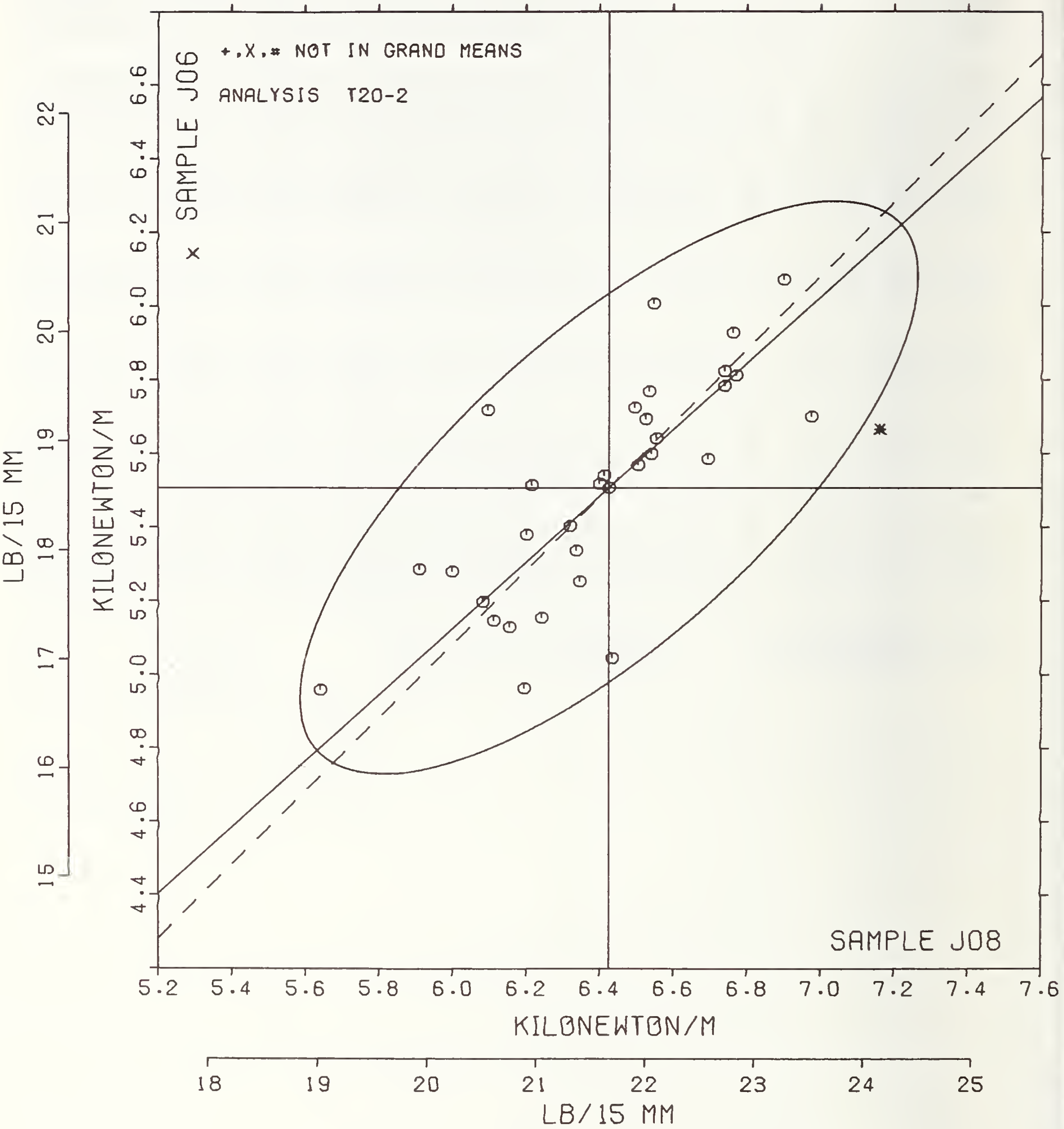
TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T404 OS-76, TENSILE BREAKING STRENGTH OF PAPER AND PAPERBOARD (PENDULUM-TYPE TESTER)

LAB		MEANS		COORDINATES		AVG		
CODE	F	J08	J06	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L241	#	1.92	1.68	-5.90	.17	.25	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L285	#	4.78	4.68	-1.78	.48	.58	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L321	X	5.30	6.14	-.41	1.23	.94	20Q	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L484	O	5.64	4.96	-.95	.12	.99	20U	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L376	O	5.91	5.29	-.53	.18	1.12	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L242	O	6.00	5.28	-.47	.12	1.08	20Y	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L182L	O	6.08	5.20	-.46	-.00	.70	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L556	O	6.10	5.72	-.10	.38	1.51	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L212	O	6.11	5.15	-.47	-.06	.86	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L275	O	6.16	5.13	-.45	-.10	1.19	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L274	O	6.20	4.96	-.53	-.25	.71	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L218	O	6.20	5.38	-.25	.05	.42	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L290	O	6.22	5.51	-.15	.14	.96	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L213	O	6.24	5.16	-.37	-.14	1.14	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L249	O	6.32	5.40	-.15	-.01	1.29	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L148	O	6.34	5.34	-.18	-.07	.75	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L313	O	6.35	5.25	-.23	-.14	.82	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L128	O	6.40	5.52	-.01	.02	.97	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L124P	O	6.41	5.54	.01	.03	.71	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L554	O	6.43	5.51	.00	-.00	.82	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L599	O	6.43	5.04	-.30	-.35	1.09	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L121	O	6.50	5.72	.20	.11	1.11	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L279P	O	6.50	5.57	.10	-.01	2.04	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L189	O	6.53	5.69	.20	.07	.79	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L108	O	6.54	5.77	.26	.12	.87	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L162	O	6.54	5.60	.15	-.01	.71	20*	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L626	O	6.55	6.01	.43	.29	1.17	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L103	O	6.55	5.64	.19	.01	.93	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L356	O	6.69	5.58	.25	-.12	.75	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L563P	O	6.74	5.82	.45	.02	1.06	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L191P	O	6.74	5.78	.42	-.00	.82	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L330	O	6.76	5.93	.53	.09	1.13	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L393	O	6.77	5.81	.46	-.01	.82	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L262	O	6.90	6.07	.73	.10	1.23	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L195	O	6.98	5.70	.54	-.22	1.44	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L585	*	7.16	5.66	.65	-.37	.99	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
GMEANS:		6.42	5.51			1.00		
		95% ELLIPSE:		1.07	.42	WITH GAMMA = 42 DEGREES		

TENSILE STRENGTH, PENDULUM TYPE

SAMPLE J08 = 6.42 KILONEWTON/M SAMPLE J06 = 5.51 KILONEWTON/M
SAMPLE J08 = 21.7 LB/15 MM SAMPLE J06 = 18.6 LB/15 MM



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REPORT NO. 56S                    TAPPI COLLABORATIVE REFERENCE PROGRAM                    NOVEMBER 1978
                                         ANALYSIS T25-1  TABLE 1
                        TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

          SAMPLE          PRINTING                           SAMPLE             KRAFT                          TEST D.= 20
LAB        K31    105 GRAMS PER SQUARE METER                  K33    123 GRAMS PER SQUARE METER
CODE       MEAN     DEV    N.DEV     SDR      R.SDR           MEAN     DEV    N.DEV     SDR      R.SDR     VAR  F  LAB

L122       88.7    11.5    1.61      9.0       .85           106.6     9.1    1.13     12.5       .98     25P  O L122
L126       75.0    -2.1    -.30      7.0       .65            96.6     -.9    -.12      8.7       .68     25G  O L126
L151       70.8    -6.4    -.89     17.6      1.65            88.7    -8.9   -1.11     17.4      1.36     25F  O L151
L182       70.5    -6.6    -.93      8.6       .81            88.8    -8.7   -1.09     13.4      1.05     25B  O L182
L234A      88.3    11.2    1.56      9.4       .88           111.0    13.4    1.67     16.3      1.28     25H  O L234A

L237B      77.7      .6     .08     10.2       .95            91.2    -6.4    -.80     12.8      1.00     25H  O L237B
L250       75.1    -2.0    -.28      5.7       .53            92.6    -5.0    -.62      7.4       .58     25A  O L250
L264       67.7    -9.4   -1.31      8.7       .82            97.2     -.4    -.05     12.7       .99     25F  O L264
L267       79.9     2.8     .38     12.8      1.20           110.5    13.0    1.62     10.1       .79     25F  O L267
L268        6.7   -70.4   -9.81       .5       .05             7.6   -89.9  -11.24       .8       .06     25B  # L268

L273       88.1    11.0    1.53     11.5      1.08            96.9     -.7    -.09     15.8      1.24     25F  O L273
L280       71.5    -5.7    -.79     10.5       .98            88.5    -9.1   -1.13     13.7      1.07     25B  O L280
L312       78.2     1.1     .15     13.4      1.25           106.8     9.3    1.16     15.5      1.21     25J  O L312
L318       79.0     1.9     .26      8.9       .83            96.4    -1.2    -.15     11.5       .90     25A  O L318
L580       74.0    -3.1    -.43      8.3       .78            61.5   -36.0   -4.50     15.5      1.21     25C  # L580

L604       69.3    -7.9   -1.10     16.0      1.51            94.1    -3.5    -.44     11.1       .87     25A  O L604
L676       53.6   -23.5   -3.28     18.6      1.75            47.9   -49.6   -6.20     14.0      1.09     25F  # L676

GR. MEAN =  77.1 JOULES/SQ M                GRAND MEAN =  97.6 JOULES/SQ M              TEST DETERMINATIONS =  20
SD MEANS =   7.2 JOULES/SQ M               SD OF MEANS =   8.0 JOULES/SQ M               14 LABS IN GRAND MEANS
                     AVERAGE SDR =  10.6 JOULES/SQ M                    AVERAGE SDR =  12.8 JOULES/SQ M
GR. MEAN = 5.283 FT.LB/SQ FT                 GRAND MEAN = 6.683 FT.LB/SQ FT
TOTAL NUMBER OF LABORATORIES REPORTING =  17
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Best values: K31 77 ± 11 joules per square meter
K33 97 ± 12 joules per square meter

The following laboratories were omitted from the grand means because of extreme test results: 580, 676.

Data from the following laboratories appear to be off by a multiplicative factor: 268.

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REPORT NO. 56S                    TAPPI COLLABORATIVE REFERENCE PROGRAM                    NOVEMBER 1978
                                         ANALYSIS T25-1  TABLE 2
                        TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB          MEANS         COORDINATES     AVG
CODE   F   K31     K33     MAJOR    MINOR   R.SDR VAR   PROPERTY---TEST INSTRUMENT---CONDITIONS

L268   #    6.7     7.6   -114.1     -4.5     .05 25B TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L676   #   53.6    47.9    -53.1    -14.2    1.42 25F TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L264   O   67.7    97.2     -6.4      6.9     .90 25F TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L604   O   69.3    94.1     -7.8      3.7    1.19 25A TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L182   O   70.5    88.8    -10.9      -.6     .93 25B TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS

L151   O   70.8    88.7    -10.9      -.9    1.51 25F TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L280   O   71.5    88.5    -10.6     -1.5    1.03 25B TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L580   #   74.0    61.5    -29.5    -21.0    1.00 25C TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L126   O   75.0    96.6     -2.1      1.0     .67 25G TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L250   O   75.1    92.6     -5.1     -1.7     .56 25A TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS

L237B  O   77.7    91.2     -4.5     -4.6     .98 25H TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
L312   O   78.2   106.8      7.8      5.2    1.23 25J TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L318   O   79.0    96.4       .3     -2.2     .87 25A TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L267   O   79.9   110.5     11.7      6.3    1.00 25F TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L273   O   88.1    96.9      6.6     -8.8    1.16 25F TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS

L234A  O   88.3   111.0     17.5       .1    1.08 25H TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
L122   O   88.7   106.6     14.4     -2.9     .91 25P TENSILE ENERGY ABS.,PACKAGING PAPER,PATTERNED FLAT JAWS

GMEANS:    77.1    97.6                      1.00
           95% ELLIPSE:     28.5     12.7    WITH GAMMA = 49 DEGREES
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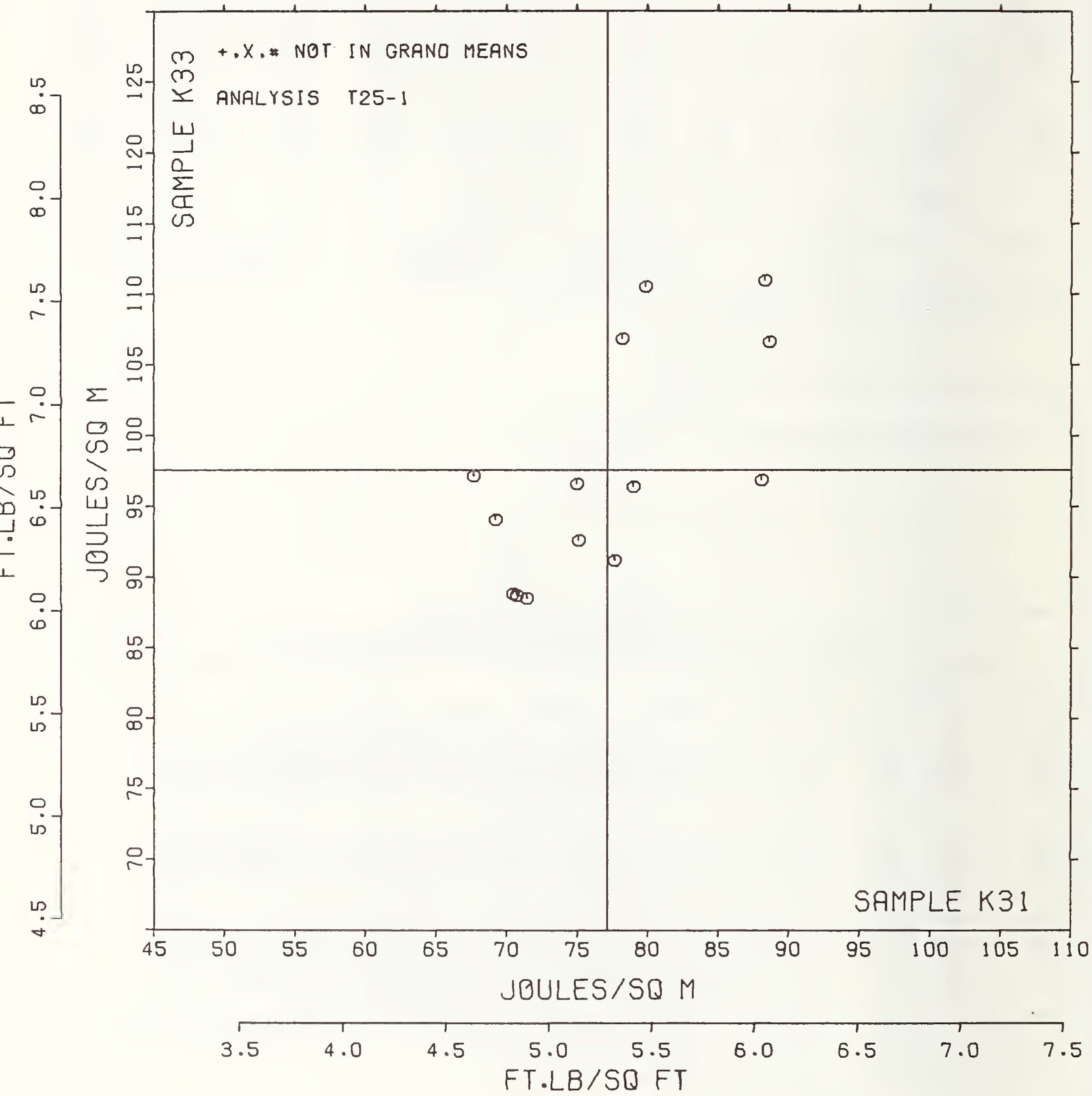
T.E.A., PACKAGING PAPERS

SAMPLE K31 = 77. JOULES/SQ M SAMPLE K33 = 98. JOULES/SQ M
SAMPLE K31 = 5.28 FT.LB/SQ FT SAMPLE K33 = 6.68 FT.LB/SQ FT



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REPORT NO. 56S                        TAPPI COLLABORATIVE REFERENCE PROGRAM                       NOVEMBER 1978
                                              ANALYSIS T26-1  TABLE 1
                           TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

          SAMPLE            PRINTING                        SAMPLE             PRINTING                   TEST D.= 20
LAB        J08    85 GRAMS PER SQUARE METER                  J06   149 GRAMS PER SQUARE METER
CODE       MEAN     DEV    N.DEV     SDR      R.SDR         MEAN     DEV    N.DEV     SDR      R.SDR       VAR  F  LAB

L122       82.0     5.9     .75     11.8      1.51          64.5     4.4     .91      6.8      1.19        26L  O L122
L139       67.2    -8.9   -1.12     11.5      1.49          56.9    -3.2    -.65      5.5       .97        26B  O L139
L163       78.4     2.4     .30      7.8      1.01          59.2     -.9    -.18      5.2       .92        26J  O L163
L167       68.3    -7.7    -.98      4.2       .54          59.3     -.7    -.15      2.3       .41        26D  O L167
L185       67.4    -8.6   -1.10      9.9      1.28          55.9    -4.1    -.85     10.1      1.78        26C  O L185

L250       75.2     -.9    -.11      4.1       .53          56.8    -3.2    -.67      4.6       .80        26A  O L250
L255       73.4    -2.7    -.34      5.1       .66          59.0    -1.1    -.22      4.0       .71        26P  O L255
L309       88.9    12.8    1.62     10.5      1.35          69.7     9.6    1.99      7.5      1.33        26J  O L309
L318       78.8     2.8     .35      9.3      1.19          61.0     1.0     .20      5.6       .99        26A  O L318
L356       87.9    11.8    1.50      7.0       .90          67.6     7.5    1.56      5.4       .95        26A  O L356

L393       79.2     3.2     .41      4.8       .62          56.6    -3.4    -.71      5.7      1.01        26V  O L393
L567       81.7     5.7     .72      8.9      1.15         103.3    43.3    8.95     10.6      1.87        26A  # L567
L592       66.0   -10.0   -1.27      7.2       .92          54.1    -6.0   -1.23      5.3       .94        26B  O L592

GR. MEAN =  76.0 JOULES/SQ M                GRAND MEAN =  60.1 JOULES/SQ M              TEST DETERMINATIONS =  20
SD MEANS =   7.9 JOULES/SQ M              SD OF MEANS =   4.8 JOULES/SQ M                  12 LABS IN GRAND MEANS
                    AVERAGE SDR =   7.8 JOULES/SQ M                  AVERAGE SDR =   5.7 JOULES/SQ M
GR. MEAN = 5.209 FT.LB/SQ FT                GRAND MEAN = 4.114 FT.LB/SQ FT
TOTAL NUMBER OF LABORATORIES REPORTING =  13
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Best values: J08 76 ± 12 joules per square meter
J06 59 ± 9 joules per square meter

The following laboratories were omitted from the grand means because of extreme test results: 567.

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REPORT NO. 56S                        TAPPI COLLABORATIVE REFERENCE PROGRAM                       NOVEMBER 1978
                                              ANALYSIS T26-1  TABLE 2
                           TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB           MEANS        COORDINATES     AVG
CODE  F    J08     J06     MAJOR    MINOR   R.SDR VAR    PROPERTY---TEST INSTRUMENT---CONDITIONS

L592  O    66.0    54.1    -11.7      -.2     .93 26B TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L139  O    67.2    56.9     -9.3      1.7    1.23 26B TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L185  O    67.4    55.9     -9.5       .7    1.53 26C TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L167  O    68.3    59.3     -7.1      3.2     .48 26D TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L255  O    73.4    59.0     -2.9       .4     .69 26P TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS

L250  O    75.2    56.8     -2.4     -2.4     .67 26A TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L163  O    78.4    59.2      1.6     -1.9     .96 26J TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L318  O    78.8    61.0      2.9      -.5    1.09 26A TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L393  O    79.2    56.6      1.1     -4.6     .82 26V TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L567  #    81.7   103.3     26.4     34.7    1.51 26A TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS

L122  O    82.0    64.5      7.3       .9    1.35 26L TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS
L356  O    87.9    67.6     14.0       .7     .92 26A TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L309  O    88.9    69.7     15.9      2.0    1.34 26J TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS

GMEANS:    76.0    60.1                      1.00
           95% ELLIPSE:     27.0      6.4    WITH GAMMA = 29 DEGREES
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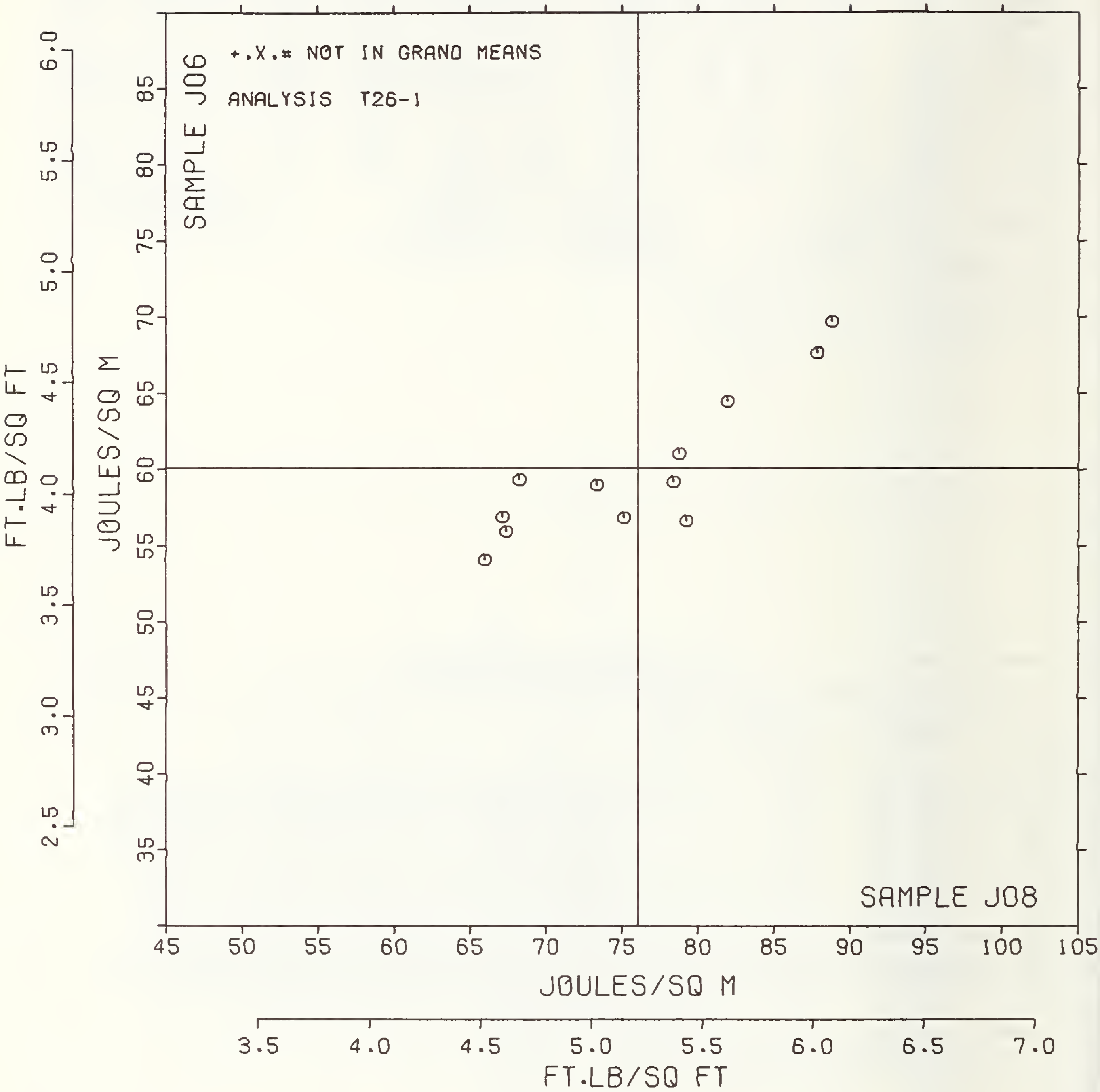
T.E.A., PRINTING PAPERS

SAMPLE J08 = 76. JOULES/SQ M SAMPLE J06 = 60. JOULES/SQ M
SAMPLE J08 = 5.21 FT.LB/SQ FT SAMPLE J06 = 4.11 FT.LB/SQ FT



REPORT NO. 56S TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1978

ANALYSIS T28-1 TABLE 1

ELONGATION TO BREAK, PERCENT - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

	SAMPLE	PRINTING				SAMPLE	KRAFT				TEST D.= 20		
LAB	K31	105 GRAMS PER SQUARE METER				K33	123 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L122	1.641	.124	1.20	.101	.85	1.794	.118	1.00	.122	.89	28P	@	L122
L126	1.392	-.126	-1.22	.085	.72	1.591	-.085	-.72	.074	.55	28C	@	L126
L151	1.880	.362	3.51	.188	1.59	2.060	.384	3.27	.196	1.44	28B	#	L151
L182	1.375	-.143	-1.38	.091	.77	1.555	-.121	-1.03	.147	1.08	28B	@	L182
L264	1.545	.027	.26	.193	1.63	1.610	-.066	-.56	.183	1.34	28B	@	L264
L265	1.534	.016	.16	.106	.90	1.596	-.080	-.68	.145	1.07	28A	@	L265
L267	1.519	.001	.01	.151	1.28	1.798	.122	1.04	.135	.99	28B	@	L267
L268	1.840	.322	3.12	.181	1.53	2.103	.427	3.63	.150	1.10	28B	#	L268
L280	1.544	.026	.25	.115	.97	1.696	.020	.17	.115	.85	28B	@	L280
L312	1.590	.072	.70	.174	1.47	1.850	.174	1.48	.140	1.02	28B	@	L312
L318	1.606	.089	.86	.092	.78	1.822	.146	1.25	.114	.84	28A	@	L318
L324	1.350	-.168	-1.62	.095	.80	1.515	-.161	-1.37	.131	.96	28P	@	L324
L336	1.465	-.053	-.51	.130	1.10	1.549	-.127	-1.08	.114	.84	28A	@	L336
L580	1.505	-.013	-.12	.176	1.49	1.190	-.486	-4.14	.155	1.14	28C	#	L580
L581	1.479	-.039	-.37	.116	.98	1.641	-.035	-.30	.153	1.12	28A	@	L581
L582	1.689	.171	1.66	.088	.74	1.770	.094	.80	.198	1.46	28A	@	L582
L676	1.955	.437	4.23	.862	7.28	1.840	.164	1.39	.649	4.76	28B	#	L676

GR. MEAN = 1.518 PERCENT GRAND MEAN = 1.676 PERCENT TEST DETERMINATIONS = 20

SD MEANS = .103 PERCENT SD OF MEANS = .118 PERCENT 13 LABS IN GRAND MEANS

AVERAGE SDR = .118 PERCENT AVERAGE SDR = .136 PERCENT

L153	2.320	.802	7.77	.140	1.18	2.490	.814	6.93	.200	1.47	28Q	+	L153

TOTAL NUMBER OF LABORATORIES REPORTING = 18

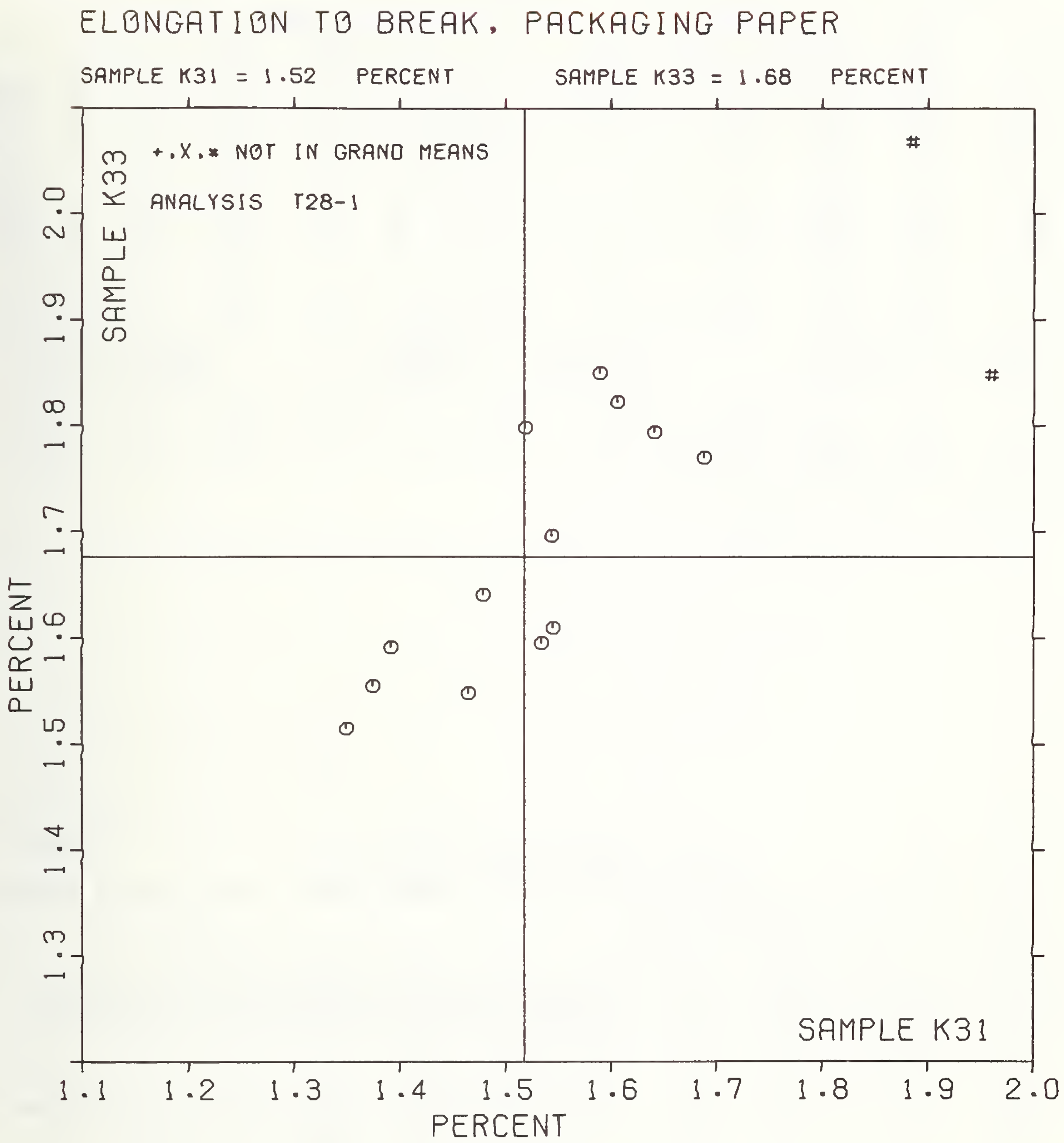
Best values: K31 1.52 ± 0.16 percent
K33 1.64 ± 0.19 percent

The following laboratories were omitted from the grand means because of extreme test results: 151, 268, 580, 676.

ANALYSIS T28-1 TABLE 2
ELONGATION TO BREAK, PERCENT - PACKAGING PAPER
TAPPI STANDARD T494 OS-70. TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS K31	MEANS K33	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L324	0	1.350	1.515	-.231	.023	.88	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L182	0	1.375	1.555	-.185	.030	.92	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L126	0	1.392	1.591	-.146	.041	.63	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L336	0	1.465	1.549	-.131	-.042	.97	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L581	0	1.479	1.641	-.052	.007	1.05	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L580	#	1.505	1.190	-.378	-.305	1.31	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L267	0	1.519	1.798	.094	.078	1.13	28E	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L265	0	1.534	1.596	-.050	-.064	.98	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L280	0	1.544	1.696	.033	-.007	.91	28E	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L264	0	1.545	1.610	-.033	-.064	1.49	28E	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L312	0	1.590	1.850	.179	.058	1.25	28E	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L318	0	1.606	1.822	.169	.027	.81	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L122	0	1.641	1.794	.170	-.018	.87	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L582	0	1.689	1.770	.183	-.070	1.10	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L268	#	1.840	2.103	.534	.031	1.31	28E	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L151	#	1.880	2.060	.527	-.027	1.51	28E	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L676	#	1.955	1.840	.408	-.227	6.02	28E	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L153	*	2.320	2.490	1.140	-.083	1.32	28Q	ELONGATION,PACKAGING PAPER,PENDULUM, PATTERNED FLAT JAWS
GMEANS:		1.518	1.676			1.00		

95% ELLIPSE: .438 .144 WITH GAMMA = 49 DEGREES


ELONGATION TO BREAK, PACKAGING PAPER
SAMPLE K31 = 1.52 PERCENT
SAMPLE K33 = 1.68 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T28-1
SAMPLE K33
PERCENT
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
SAMPLE K31
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
PERCENT

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REPORT NO. 56S                      TAPPI COLLABORATIVE REFERENCE PROGRAM                     NOVEMBER 1978
                                           ANALYSIS T29-1  TABLE 1
                                    ELONGATION TO BREAK, PERCENT - PRINTING PAPER
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

         SAMPLE              PRINTING                        SAMPLE              PRINTING                 TEST D.= 20
LAB       J08     85 GRAMS PER SQUARE METER                   J06   149 GRAMS PER SQUARE METER
CODE     MEAN     DEV     N.DEV     SDR      R.SDR           MEAN     DEV     N.DEV     SDR      R.SDR      VAR  F  LAB

L105     1.350   -.469   -1.92     .170     1.21            1.225   -.455   -2.05     .138     1.16       29A  O L105
L122     2.089    .270    1.11     .199     1.41            1.852    .172     .77     .134     1.13       29P  O L122
L141T    1.767   -.052    -.21     .095      .67            1.625   -.055    -.25     .114      .96       29D  O L141T
L185     1.675   -.144    -.59     .145     1.03            1.555   -.125    -.56     .193     1.62       29C  O L185
L190R    1.780   -.039    -.16     .209     1.48            1.538   -.142    -.64     .132     1.11       29A  O L190R

L255     1.861    .042     .17     .089      .63            1.696    .016     .07     .079      .67       29P  O L255
L278     1.739   -.080    -.33     .123      .87            1.967    .287    1.29     .099      .83       29A  * L278
L309     2.201    .382    1.56     .135      .96            1.990    .310    1.39     .125     1.05       29A  O L309
L318     2.105    .286    1.17     .107      .76            1.916    .236    1.06     .069      .58       29A  O L318
L344     1.859    .040     .17     .171     1.21            1.678   -.002    -.01     .125     1.05       29A  O L344

L356     2.046    .227     .93     .101      .71            1.789    .109     .49     .092      .77       29A  O L356
L567     1.569   -.250   -1.02     .125      .89            1.432   -.248   -1.11     .115      .97       29A  O L567
L592     1.605   -.214    -.88     .148     1.05            1.577   -.103    -.46     .110      .93       29D  O L592

GR. MEAN = 1.819 PERCENT                         GRAND MEAN = 1.680 PERCENT                  TEST DETERMINATIONS =  20
SD MEANS =  .244 PERCENT                        SD OF MEANS =  .223 PERCENT                   13 LABS IN GRAND MEANS
                     AVERAGE SDR =  .141 PERCENT                        AVERAGE SDR =  .119 PERCENT

L242     2.110    .291    1.19     .194     1.38            2.110    .430    1.93     .091      .77       29R  + L242
L484     1.583   -.236    -.97     .271     1.92            1.523   -.157    -.70     .220     1.85       29R  + L484
L626     1.720   -.099    -.41     .151     1.07            1.590   -.090    -.41     .145     1.22       29R  + L626
TOTAL NUMBER OF LABORATORIES REPORTING =  16
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Best values: J08 1.82 ± 0.35 percent
               J06 1.68 ± 0.32 percent

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REPORT NO. 56S                      TAPPI COLLABORATIVE REFERENCE PROGRAM                     NOVEMBER 1978
                                           ANALYSIS T29-1  TABLE 2
                                    ELONGATION TO BREAK, PERCENT - PRINTING PAPER
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB            MEANS         COORDINATES    AVG
CODE   F    J08     J06     MAJOR    MINOR   R.SDR VAR   PROPERTY---TEST INSTRUMENT---CONDITIONS

L105   O  1.350  1.225    -.653   -.025    1.18 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L567   O  1.569  1.432    -.351   -.018     .93 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L484   +  1.583  1.523    -.280    .041    1.89 29R ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L592   O  1.605  1.577    -.228    .066     .99 29D ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L185   O  1.675  1.555    -.191    .003    1.33 29C ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS

L626   +  1.720  1.590    -.134   -.001    1.14 29R ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L278   *  1.739  1.967     .133    .267     .85 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L141T  O  1.767  1.625    -.075   -.006     .82 29D ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L190R  O  1.780  1.538    -.124   -.080    1.30 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L344   O  1.859  1.678     .029   -.029    1.13 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS

L255   O  1.861  1.696     .042   -.016     .65 29P ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L356   O  2.046  1.789     .242   -.070     .74 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L122   O  2.089  1.852     .316   -.052    1.27 29P ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L318   O  2.105  1.916     .371   -.016     .67 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L242   +  2.110  2.110     .503    .126    1.07 29R ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS

L309   O  2.201  1.990     .491   -.025    1.00 29A ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS

GMEANS:   1.819  1.680                     1.00
             95% ELLIPSE:  .939    .259    WITH GAMMA = 41 DEGREES
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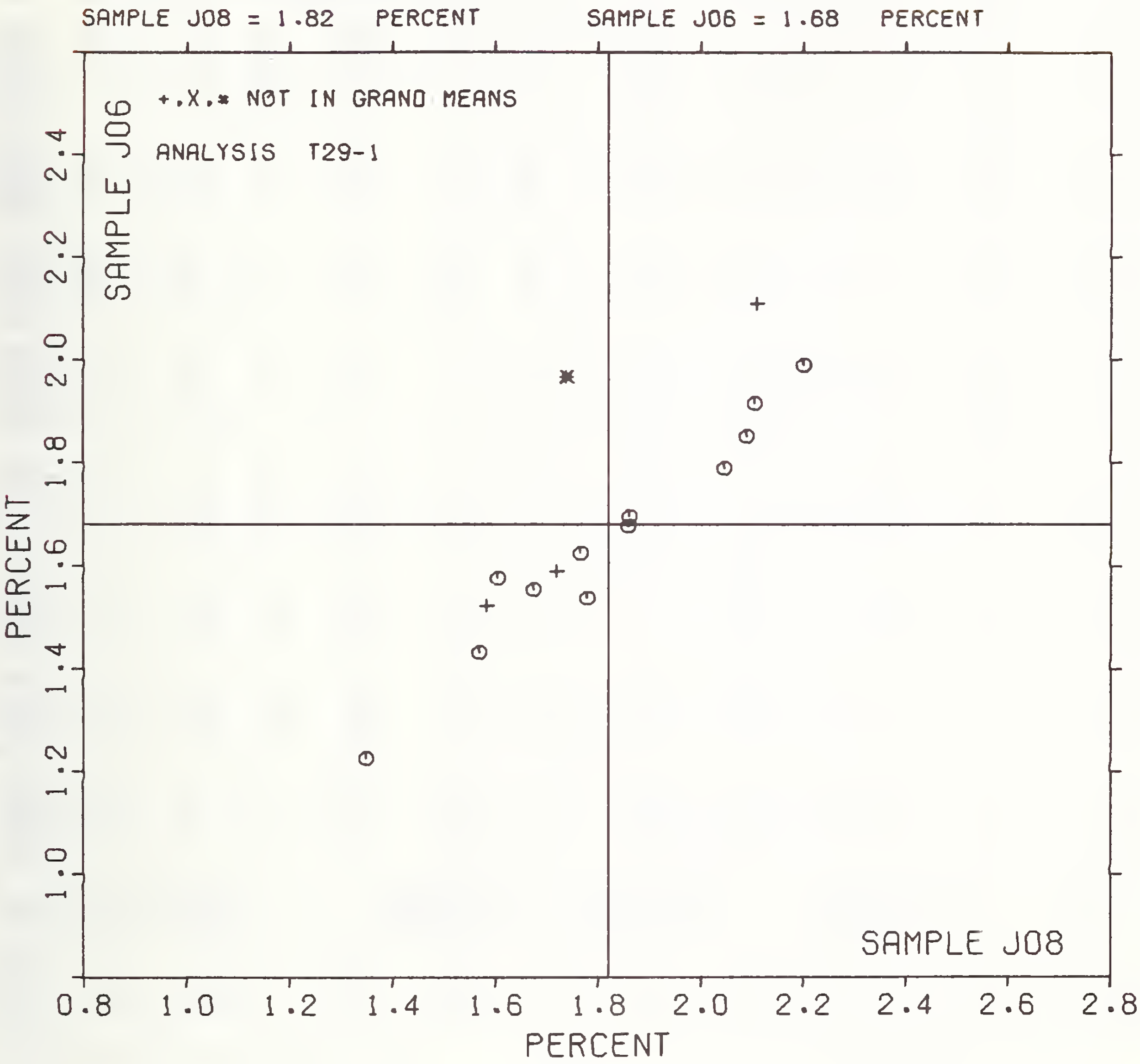


ELONGATION TO BREAK, PRINTING PAPER

ANALYSIS T30-1 TABLE 1
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI STANDARD T511 SU-69

	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D.= 15		
LAB	J31	86 GRAMS PER SQUARE METER				J30	149 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	61.	-12.	-.81	17.	.89	12.	-20.	-1.71	4.	.18	30M	0	L105
L121	85.	12.	.82	18.	.95	20.	-12.	-1.03	15.	.71	30M	0	L121
L122	72.	-1.	-.06	29.	1.51	33.	1.	.11	23.	1.09	30M	0	L122
L124	61.	-12.	-.80	15.	.78	25.	-7.	-.62	15.	.73	30N	0	L124
L150	68.	-5.	-.30	19.	.98	36.	4.	.34	26.	1.23	30M	0	L150
L162	74.	2.	.10	19.	1.00	28.	-4.	-.37	24.	1.17	30M	0	L162
L163	64.	-9.	-.58	22.	1.18	24.	-8.	-.67	10.	.48	30N	0	L163
L182M	80.	7.	.46	20.	1.06	30.	-2.	-.20	17.	.80	30M	0	L182M
L185	85.	12.	.81	26.	1.36	24.	-8.	-.67	8.	.40	30N	0	L185
L190C	62.	-11.	-.71	17.	.88	22.	-9.	-.81	5.	.25	30N	0	L190C
L212	69.	-4.	-.25	15.	.77	22.	-10.	-.88	11.	.53	30M	0	L212
L223F	81.	8.	.55	14.	.76	21.	-11.	-.92	4.	.20	30M	0	L223F
L230	69.	-4.	-.25	21.	1.10	28.	-3.	-.29	19.	.93	30N	0	L230
L232	82.	9.	.59	29.	1.54	64.	32.	2.74	48.	2.30	30N	*	L232
L236	73.	0.	.02	18.	.93	36.	4.	.38	24.	1.17	30N	0	L236
L238A	61.	-12.	-.80	13.	.67	35.	3.	.27	25.	1.18	30N	0	L238A
L238B	46.	-27.	-1.77	16.	.82	19.	-13.	-1.09	13.	.62	30D	0	L238B
L254	31.	-42.	-2.78	14.	.77	21.	-11.	-.96	13.	.61	30M	*	L254
L262	65.	-8.	-.53	17.	.90	34.	2.	.15	31.	1.47	30N	0	L262
L274	76.	3.	.21	29.	1.54	33.	1.	.10	27.	1.30	30N	0	L274
L275	80.	7.	.44	23.	1.21	38.	6.	.53	27.	1.31	30N	0	L275
L278	60.	-13.	-.88	11.	.59	34.	2.	.15	20.	.97	30C	0	L278
L279	65.	-8.	-.53	14.	.75	31.	-1.	-.06	23.	1.10	30N	0	L279
L285A	95.	22.	1.43	26.	1.38	48.	16.	1.39	35.	1.66	30N	0	L285A
L285B	98.	26.	1.69	33.	1.76	53.	21.	1.82	50.	2.38	30N	0	L285B
L299	77.	4.	.25	22.	1.19	39.	7.	.64	32.	1.53	30N	0	L299
L321	97.	24.	1.61	25.	1.34	57.	25.	2.19	41.	1.94	30M	0	L321
L326N	62.	-11.	-.75	18.	.97	32.	0.	.01	28.	1.36	30N	0	L326N
L339	54.	-19.	-1.27	10.	.51	26.	-5.	-.47	25.	1.18	30N	0	L339
L366A	63.	-10.	-.65	22.	1.17	39.	8.	.65	31.	1.48	30N	0	L366A
L376	52.	-21.	-1.39	10.	.52	25.	-7.	-.61	17.	.83	30N	0	L376
L388	78.	6.	.37	21.	1.10	46.	14.	1.20	29.	1.38	30N	0	L388
L390	74.	1.	.07	14.	.76	40.	8.	.68	31.	1.47	30N	0	L390
L393	67.	-5.	-.36	10.	.51	31.	-1.	-.11	14.	.66	30M	0	L393
L396M	95.	22.	1.46	26.	1.37	55.	23.	1.97	41.	1.93	30N	0	L396M
L567	85.	12.	.80	18.	.96	29.	-3.	-.22	10.	.46	30N	0	L567
L589	79.	6.	.37	15.	.78	17.	-15.	-1.31	3.	.13	30N	0	L589
L599	73.	-0.	-.01	18.	.95	25.	-7.	-.58	12.	.58	30C	0	L599
L622	104.	31.	2.07	42.	2.20	22.	-10.	-.83	8.	.39	30M	*	L622
L670	93.	20.	1.35	21.	1.12	21.	-11.	-.93	4.	.21	30N	0	L670

GR. MEAN = 73. DOUBLE FOLDS GRAND MEAN = 32. DOUBLE FOLDS TEST DETERMINATIONS = 15
SD MEANS = 15. DOUBLE FOLDS SD OF MEANS = 12. DOUBLE FOLDS 40 LABS IN GRAND MEANS
AVERAGE SDR = 19. DOUBLE FOLDS AVERAGE SDR = 21. DOUBLE FOLDS

L182S	93.	21.	1.36	17.	.88	29.	-3.	-.23	14.	.65	30S	+	L182S
L190D	165.	92.	6.08	52.	2.72	16.	-16.	-1.35	4.	.19	30S	+	L190D
L280	42.	-30.	-2.02	25.	1.31	32.	-0.	-.01	26.	1.23	30K	+	L280
L326S	138.	65.	4.28	24.	1.27	63.	32.	2.72	76.	3.62	30S	+	L326S

TOTAL NUMBER OF LABORATORIES REPORTING = 44

Best values: J31 75 double folds
J30 32 double folds

The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

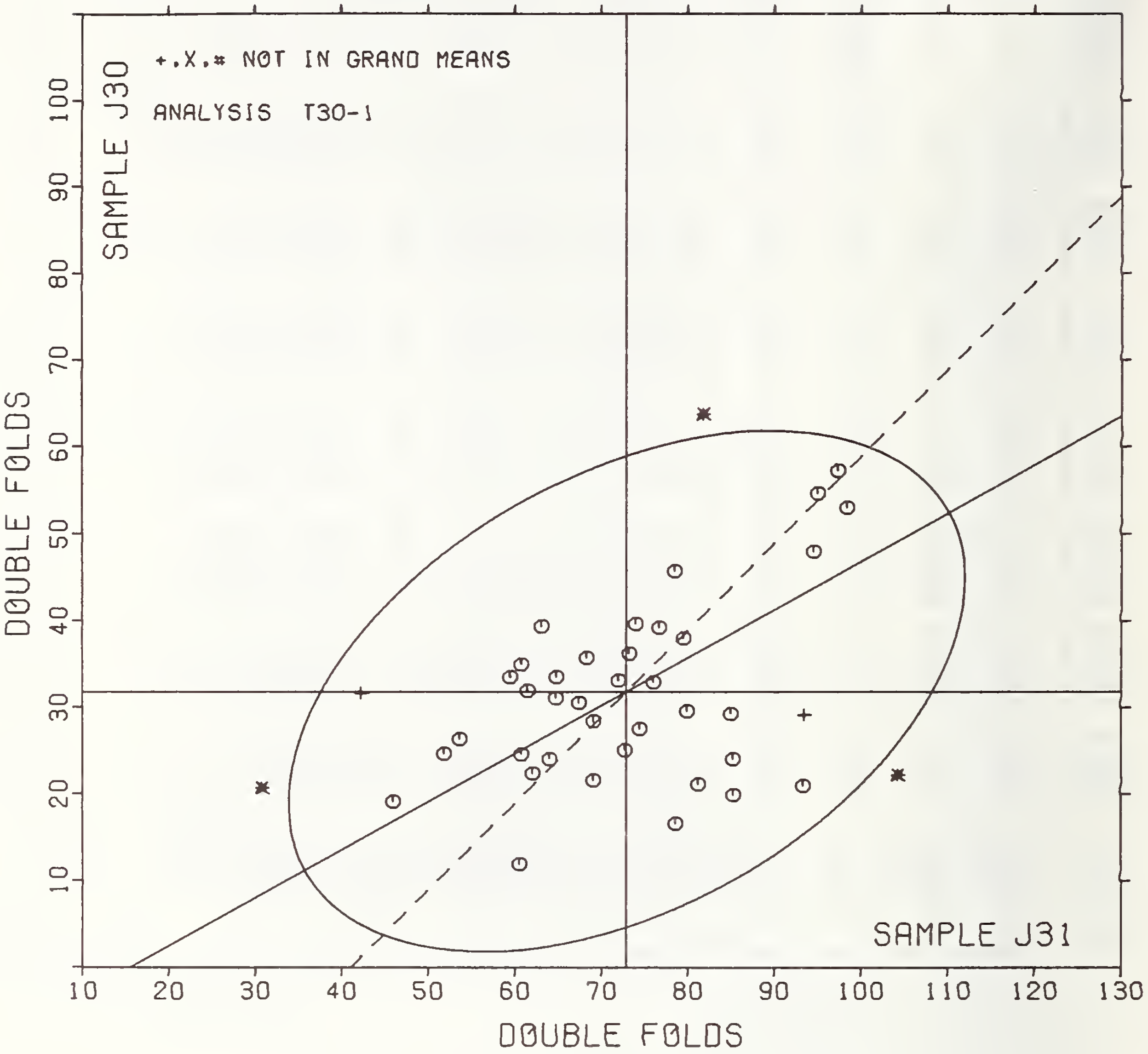
Please see page 43 of this report for a demonstration of this proposal.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T30-1 TABLE 2
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI STANDARD T511 SU-69

LAB CODE	F	MEANS J31	J30	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L254	*	31.	21.	-42.	11.	.69	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L280	+	42.	32.	-27.	15.	1.27	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L238B	O	46.	19.	-30.	2.	.72	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L376	O	52.	25.	-22.	4.	.68	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L339	O	54.	26.	-19.	5.	.85	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L278	O	60.	34.	-11.	8.	.78	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L105	O	61.	12.	-20.	-11.	.54	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L124	O	61.	25.	-14.	-0.	.75	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238A	O	61.	35.	-9.	9.	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	O	62.	32.	-10.	6.	1.16	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190C	O	62.	22.	-14.	-3.	.57	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L366A	O	63.	39.	-5.	11.	1.33	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L163	O	64.	24.	-11.	-2.	.83	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	O	65.	31.	-7.	3.	.93	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L262	O	65.	34.	-6.	5.	1.18	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L393	O	67.	31.	-5.	2.	.59	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L150	O	68.	36.	-2.	6.	1.11	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L212	O	69.	22.	-8.	-7.	.65	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L230	O	69.	28.	-5.	-1.	1.01	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L122	O	72.	33.	-0.	2.	1.30	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L599	O	73.	25.	-3.	-6.	.76	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L236	O	73.	36.	2.	4.	1.05	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L390	O	74.	40.	5.	6.	1.11	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L162	O	74.	28.	-1.	-5.	1.08	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L274	O	76.	33.	3.	-1.	1.42	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L299	O	77.	39.	7.	5.	1.36	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	O	78.	46.	12.	9.	1.24	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	O	79.	17.	-2.	-16.	.46	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L275	O	80.	38.	9.	2.	1.26	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	O	80.	30.	5.	-5.	.93	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L223F	O	81.	21.	2.	-13.	.48	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L232	*	82.	64.	23.	24.	1.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L567	O	85.	29.	9.	-8.	.71	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	O	85.	24.	7.	-13.	.88	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L121	O	85.	20.	5.	-16.	.83	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L670	O	93.	21.	13.	-19.	.66	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	+	93.	29.	17.	-12.	.77	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L285A	O	95.	48.	27.	4.	1.52	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L396M	O	95.	55.	30.	9.	1.65	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L321	O	97.	57.	34.	10.	1.64	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L285B	O	98.	53.	33.	6.	2.07	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L622	*	104.	22.	23.	-24.	1.29	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L326S	+	138.	63.	72.	-4.	2.44	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L190D	+	165.	16.	73.	-58.	1.46	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
GMEANS:		73.	32.			1.00		
		95% ELLIPSE:		42.	25.	WITH GAMMA = 29 DEGREES		

FOLDING ENDURANCE (MIT)

SAMPLE J31 = 73. DOUBLE FOLDS SAMPLE J30 = 32. DOUBLE FOLDS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T30-2 TABLE 1
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB	SAMPLE J31	PRINTING 86 GRAMS PER SQUARE METER				SAMPLE J30	PRINTING 149 GRAMS PER SQUARE METER				TEST D.= 15		
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	1.76	-.08	-1.05	.16	1.28	1.05	-.35	-2.67	.17	.69	30M	*	L105
L121	1.92	.08	.96	.09	.74	1.23	-.17	-1.32	.23	.93	30M	0	L121
L122	1.80	-.05	-.62	.29	2.40	1.46	.05	.41	.21	.89	30M	0	L122
L124	1.77	-.07	-.90	.10	.84	1.33	-.08	-.58	.23	.95	30N	0	L124
L150	1.82	-.03	-.31	.12	.97	1.47	.07	.53	.25	1.04	30M	0	L150
L162	1.86	.01	.18	.11	.89	1.35	-.06	-.43	.26	1.06	30M	0	L162
L163	1.78	-.06	-.80	.16	1.28	1.35	-.05	-.38	.15	.62	30N	0	L163
L182M	1.89	.04	.56	.11	.88	1.42	.02	.14	.20	.81	30M	0	L182M
L185	1.91	.06	.79	.15	1.23	1.36	-.04	-.32	.13	.54	30N	0	L185
L190C	1.78	-.07	-.82	.12	.94	1.34	-.07	-.50	.10	.43	30N	0	L190C
L212	1.83	-.02	-.19	.10	.80	1.30	-.10	-.78	.16	.65	30M	0	L212
L223F	1.90	.06	.73	.08	.63	1.32	-.09	-.66	.08	.35	30M	0	L223F
L230	1.82	-.03	-.32	.14	1.15	1.38	-.02	-.18	.24	1.01	30N	0	L230
L232	1.88	.04	.49	.17	1.37	1.70	.30	2.26	.30	1.22	30N	0	L232
L236	1.85	.01	.09	.11	.91	1.48	.08	.57	.26	1.08	30N	0	L236
L238A	1.77	-.07	-.88	.10	.79	1.45	.05	.38	.28	1.15	30N	0	L238A
L238B	1.64	-.21	-2.57	.16	1.27	1.21	-.20	-1.49	.25	1.03	30D	*	L238B
L254	1.42	-.42	-5.27	.29	2.38	1.24	-.17	-1.26	.27	1.11	30M	X	L254
L262	1.80	-.05	-.59	.12	.96	1.36	-.04	-.31	.38	1.58	30N	0	L262
L274	1.85	.00	.02	.19	1.54	1.40	-.01	-.06	.33	1.35	30N	0	L274
L275	1.88	.04	.49	.12	1.00	1.48	.08	.61	.29	1.19	30N	0	L275
L278	1.77	-.08	-.96	.08	.68	1.46	.05	.40	.25	1.02	30C	0	L278
L279	1.80	-.04	-.54	.10	.82	1.39	-.01	-.08	.29	1.20	30N	0	L279
L285A	1.96	.11	1.40	.14	1.10	1.58	.17	1.31	.31	1.29	30N	0	L285A
L285B	1.97	.12	1.55	.15	1.22	1.56	.16	1.21	.37	1.55	30N	0	L285B
L299	1.86	.02	.23	.15	1.21	1.46	.06	.45	.34	1.40	30N	0	L299
L321	1.97	.13	1.59	.12	.99	1.66	.25	1.90	.31	1.27	30M	0	L321
L326N	1.77	-.08	-.96	.15	1.19	1.36	-.05	-.36	.36	1.50	30N	0	L326N
L339	1.72	-.12	-1.50	.08	.62	1.25	-.16	-1.19	.39	1.61	30N	0	L339
L366A	1.77	-.07	-.88	.16	1.29	1.47	.07	.53	.33	1.35	30N	0	L366A
L376	1.71	-.14	-1.69	.08	.65	1.30	-.10	-.78	.28	1.15	30N	0	L376
L388	1.88	.04	.44	.12	.94	1.59	.18	1.40	.25	1.04	30N	0	L388
L390	1.86	.02	.21	.09	.70	1.49	.08	.62	.31	1.29	30N	0	L390
L393	1.82	-.02	-.25	.06	.51	1.44	.04	.27	.21	.86	30M	0	L393
L396M	1.96	.12	1.44	.13	1.05	1.64	.23	1.78	.29	1.21	30N	0	L396M
L567	1.92	.08	.94	.09	.76	1.45	.05	.35	.11	.47	30N	0	L567
L589	1.89	.04	.53	.08	.69	1.21	-.19	-1.44	.07	.30	30N	0	L589
L599	1.85	.00	.04	.12	.96	1.37	-.04	-.27	.15	.64	30C	0	L599
L622	1.98	.14	1.74	.18	1.46	1.32	-.08	-.64	.16	.66	30M	0	L622
L670	1.96	.11	1.42	.10	.84	1.31	-.09	-.68	.09	.37	30N	0	L670

GR. MEAN = 1.84 LOG(10) FOLD　　GRAND MEAN = 1.40 LOG(10) FOLD　　TEST DETERMINATIONS = 15
SD MEANS = .08 LOG(10) FOLD　　SD OF MEANS = .13 LOG(10) FOLD　　39 LABS IN GRAND MEANS
AVERAGE SDR = .12 LOG(10) FOLD　　AVERAGE SDR = .24 LOG(10) FOLD

LAB CODE	J31 MEAN	DEV	N.DEV	SDR	R.SDR	J30 MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L182S	1.96	.12	1.48	.08	.66	1.43	.03	.21	.16	.67	30S	+	L182S
L190D	2.20	.35	4.37	.14	1.15	1.20	-.21	-1.58	.11	.44	30S	+	L190D
L280	1.55	-.29	-3.66	.27	2.22	1.39	-.01	-.10	.30	1.25	30K	+	L280
L326S	2.13	.29	3.57	.08	.65	1.50	.09	.69	.53	2.17	30S	+	L326S

TOTAL NUMBER OF LABORATORIES REPORTING = 44

The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Analysis T30-1 in this report is the same as in the past with no changes. The analysis, T30-2, shows the data as the ISO proposes. This analysis uses the raw data reported for T30-1. The raw data are converted to the logarithm (base 10) as shown in the example to the right, and then the mean of the converted data is calculated and reported as ISO folding endurance.

Raw data (Folding number in double folds)	log (base 10) of raw data
207	2.32
166	2.22
151	2.18
332	2.52
260	2.41
137	2.14
199	2.30
230	2.36
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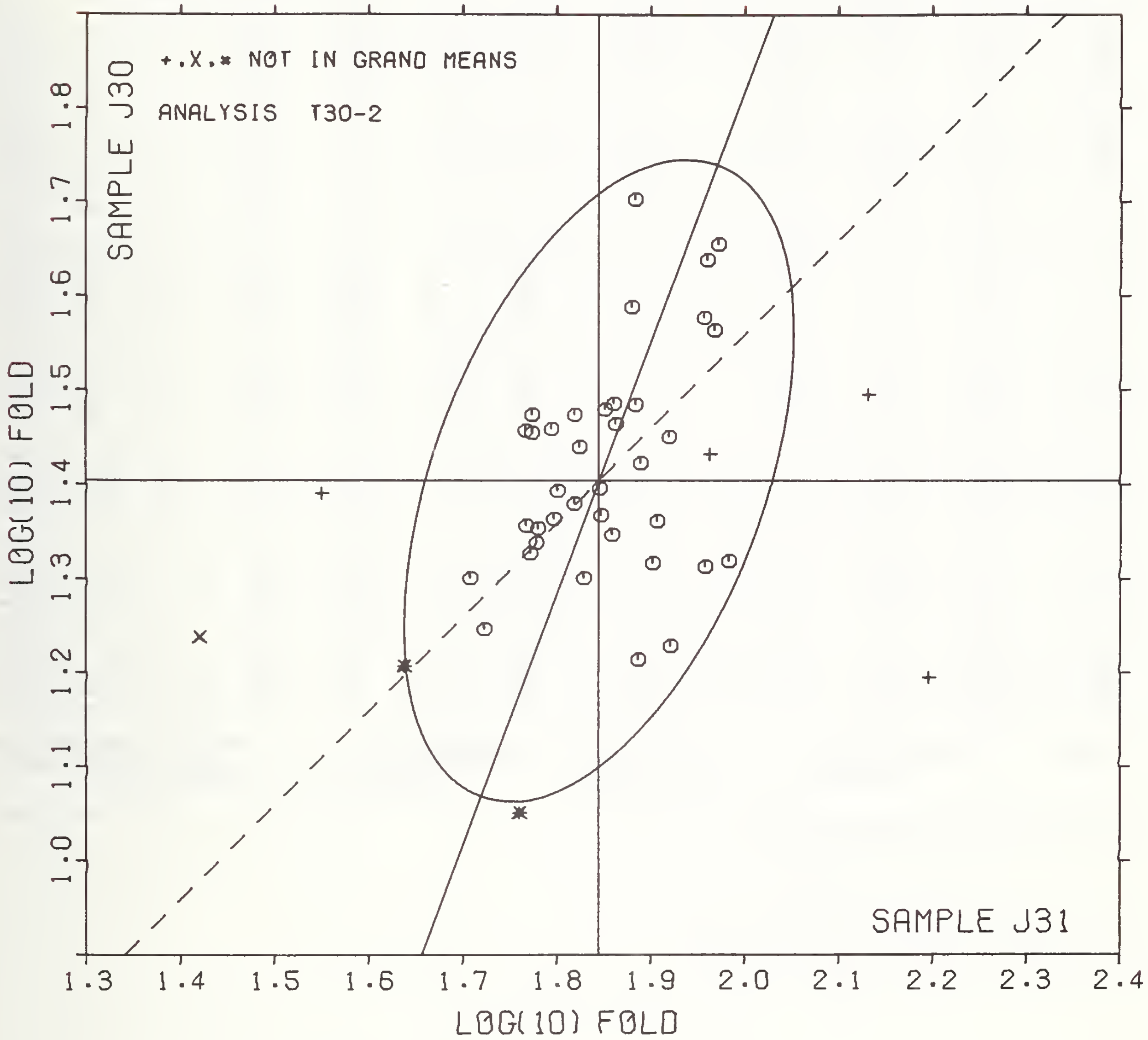
210	2.31
mean of raw data	mean of logs "Folding endurance"

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T30-2 TABLE 2
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB		MEANS		COORDINATES		AVG		
CODE	F	J31	J30	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L254	X	1.42	1.24	-.30	.34	1.74	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L280	•	1.55	1.39	-.12	.27	1.73	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L238B	*	1.64	1.21	-.26	.12	1.15	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L376	O	1.71	1.30	-.14	.09	.90	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L339	O	1.72	1.25	-.19	.06	1.11	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L105	*	1.76	1.05	-.36	-.05	.98	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L278	O	1.77	1.46	.02	.09	.85	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L326N	O	1.77	1.36	-.07	.06	1.34	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	O	1.77	1.33	-.10	.04	.89	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L366A	O	1.77	1.47	.04	.09	1.32	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238A	O	1.77	1.45	.02	.08	.97	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190C	O	1.78	1.34	-.08	.04	.69	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L163	O	1.78	1.35	-.07	.04	.95	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L122	O	1.80	1.46	.03	.07	1.64	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L262	O	1.80	1.36	-.05	.03	1.27	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	O	1.80	1.39	-.03	.04	1.01	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L230	O	1.82	1.38	-.03	.02	1.08	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L150	O	1.82	1.47	.06	.05	1.00	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L393	O	1.82	1.44	.03	.03	.68	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L212	O	1.83	1.30	-.10	-.02	.72	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L274	O	1.85	1.40	-.01	-.00	1.44	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L599	O	1.85	1.37	-.03	-.02	.80	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L236	O	1.85	1.48	.07	.02	.99	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L162	O	1.86	1.35	-.05	-.03	.98	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L390	O	1.86	1.49	.08	.01	.99	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L299	O	1.86	1.46	.06	.00	1.30	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	O	1.88	1.59	.19	.03	.99	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L232	O	1.88	1.70	.29	.07	1.29	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L275	O	1.88	1.48	.09	-.01	1.10	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	O	1.89	1.21	-.16	-.11	.49	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	O	1.89	1.42	.03	-.04	.85	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L223F	O	1.90	1.32	-.06	-.09	.49	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L185	O	1.91	1.36	-.02	-.07	.88	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L567	O	1.92	1.45	.07	-.05	.61	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L121	O	1.92	1.23	-.14	-.13	.84	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L285A	O	1.96	1.58	.20	-.05	1.19	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L670	O	1.96	1.31	-.04	-.14	.60	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L396M	O	1.96	1.64	.26	-.03	1.13	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	+	1.96	1.43	.07	-.10	.66	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L285B	O	1.97	1.56	.19	-.06	1.38	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L321	O	1.97	1.66	.28	-.03	1.13	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L622	O	1.98	1.32	-.03	-.16	1.06	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L326S	+	2.13	1.50	.19	-.24	1.41	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L190D	+	2.20	1.20	-.07	-.40	.79	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
GMEANS:		1.84	1.40			1.00		
		95% ELLIPSE:		.36	.18	WITH GAMMA = 69 DEGREES		

FOLDING ENDURANCE (MIT)

SAMPLE J31 = 1.84 LOG(10) FOLD SAMPLE J30 = 1.40 LOG(10) FOLD



ANALYSIS T35-1 TABLE 1
GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D. = 10		
LAB	J25	103 GRAMS PER SQUARE METER				J27	93 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	P	LAB
L121	262.	21.	1.46	14.	1.28	527.	50.	1.61	42.	1.63	35G	O	L121
L132	245.	4.	.30	14.	1.24	456.	-21.	-.69	59.	2.30	35G	O	L132
L139	242.	1.	.09	7.	.63	444.	-33.	-1.08	10.	.41	35G	O	L139
L148	239.	-1.	-.10	8.	.72	464.	-13.	-.43	15.	.61	35G	O	L148
L153	239.	-1.	-.08	6.	.52	460.	-17.	-.57	25.	.97	35G	O	L153
L162	230.	-10.	-.69	11.	1.02	498.	21.	.67	35.	1.38	35G	O	L162
L163	210.	-30.	-2.05	15.	1.35	457.	-20.	-.64	18.	.71	35G	O	L163
L183	258.	17.	1.19	11.	1.02	499.	22.	.70	17.	.67	35G	O	L183
L190C	242.	2.	.11	12.	1.08	476.	-1.	-.03	16.	.64	35G	O	L190C
L195	271.	31.	2.08	21.	1.92	553.	76.	2.46	32.	1.26	35G	*	L195
L212	244.	4.	.24	11.	.98	524.	47.	1.51	44.	1.71	35G	O	L212
L223	235.	-6.	-.38	10.	.87	451.	-26.	-.86	12.	.46	35G	O	L223
L224	244.	4.	.27	11.	.97	524.	47.	1.53	62.	2.41	35G	O	L224
L232	234.	-7.	-.45	8.	.74	465.	-12.	-.40	24.	.93	35G	O	L232
L236	220.	-21.	-1.41	10.	.89	436.	-41.	-1.34	21.	.80	35G	O	L236
L241	169.	-71.	-4.86	9.	.84	251.	-226.	-7.33	10.	.40	35G	#	L241
L249	233.	-7.	-.51	10.	.96	511.	34.	1.10	42.	1.64	35G	O	L249
L254	219.	-22.	-1.50	8.	.75	437.	-40.	-1.29	16.	.61	35G	O	L254
L260	248.	7.	.50	8.	.69	460.	-18.	-.57	11.	.45	35G	O	L260
L268	219.	-21.	-1.46	9.	.85	456.	-22.	-.70	15.	.60	35G	O	L268
L285	1150.	909.	62.01	125.	11.37	2380.	1903.	61.74	220.	8.59	35G	#	L285
L291	249.	9.	.61	13.	1.15	478.	1.	.03	18.	.72	35G	O	L291
L308	233.	-7.	-.48	17.	1.52	481.	3.	.11	21.	.81	35G	O	L308
L321	211.	-29.	-2.00	10.	.93	455.	-22.	-.72	28.	1.09	35G	O	L321
L356	235.	-6.	-.40	15.	1.33	468.	-9.	-.30	32.	1.26	35G	O	L356
L376	242.	2.	.13	10.	.90	469.	-9.	-.28	17.	.66	35G	O	L376
L382	251.	11.	.73	10.	.92	466.	-11.	-.36	23.	.91	35G	O	L382
L390	268.	27.	1.85	18.	1.57	499.	21.	.70	27.	1.07	35G	O	L390
L396	249.	9.	.61	9.	.85	454.	-23.	-.76	16.	.63	35G	O	L396
L567	252.	11.	.78	10.	.94	434.	-43.	-1.40	16.	.64	35G	O	L567
L600	245.	5.	.34	11.	.97	482.	4.	.14	27.	1.04	35G	O	L600
L648	245.	5.	.31	10.	.94	530.	53.	1.71	37.	1.43	35G	O	L648
L650	239.	-2.	-.11	14.	1.32	482.	5.	.15	21.	.83	35G	O	L650

GR. MEAN = 241. GURLEY UNITS GRAND MEAN = 477. GURLEY UNITS TEST DETERMINATIONS = 10
SD MEANS = 15. GURLEY UNITS SD OF MEANS = 31. GURLEY UNITS 31 LABS IN GRAND MEANS
AVERAGE SDR = 11. GURLEY UNITS AVERAGE SDR = 26. GURLEY UNITS

L213	244.	3.	.22	6.	.59	499.	22.	.70	47.	1.85	35H	•	L213

TOTAL NUMBER OF LABORATORIES REPORTING = 34

Best values: J25 240 ± 20 Gurley units
J27 470 ± 50 Gurley units

The following laboratories were omitted from the grand means because of extreme test results: 241.

Data from the following laboratories appear to be off by a multiplicative factor: 285.

ANALYSIS T35-1 TABLE 2

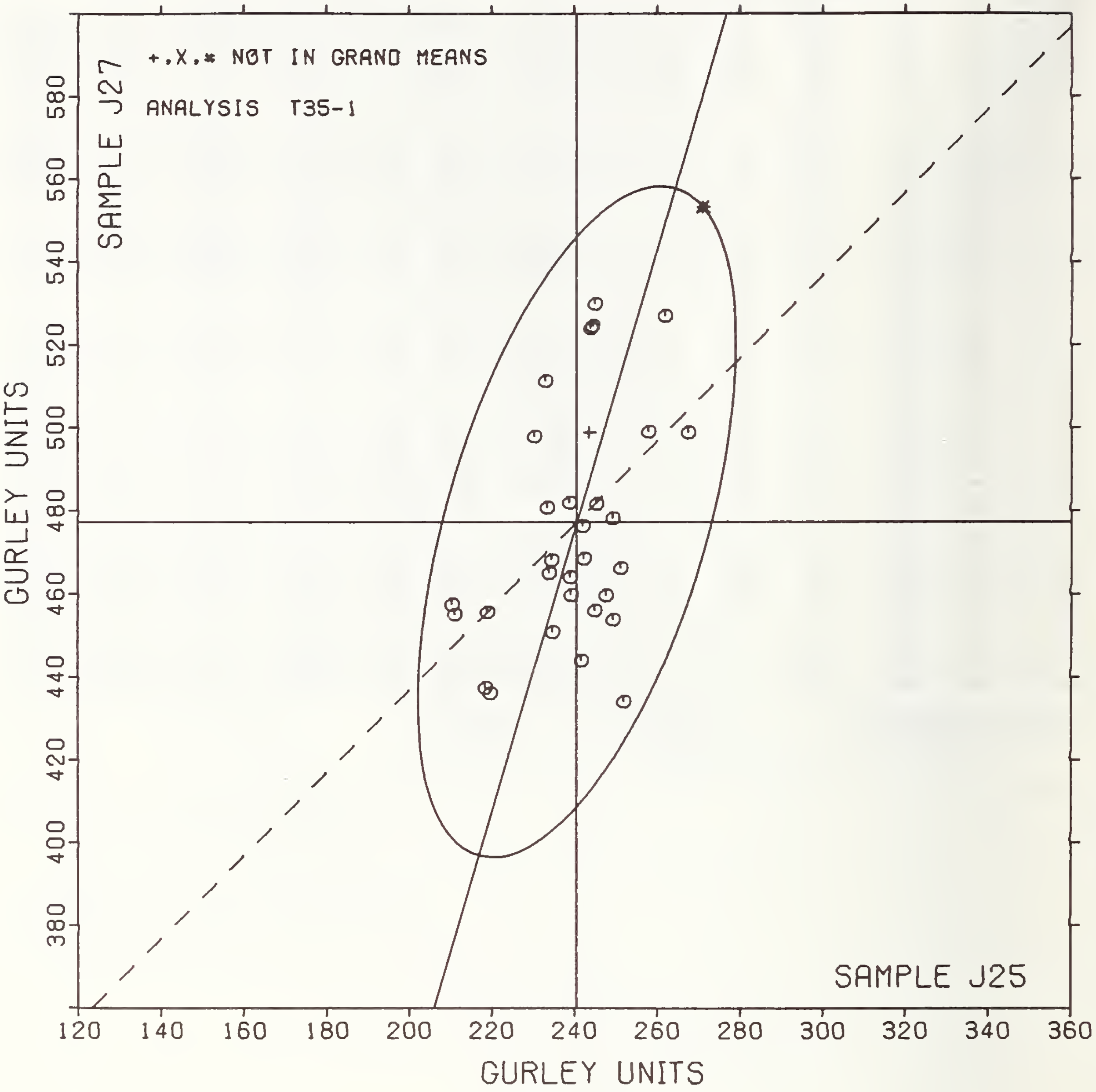
GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB CODE	F	MEANS J25	J27	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L241	#	169.	251.	-237.	4.	.62	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L163	0	210.	457.	-27.	23.	1.03	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L321	0	211.	455.	-30.	22.	1.01	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L254	0	219.	437.	-44.	10.	.68	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L268	0	219.	456.	-27.	14.	.73	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L236	0	220.	436.	-45.	8.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L162	0	230.	498.	17.	15.	1.20	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L249	0	233.	511.	30.	17.	1.30	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L308	0	233.	481.	1.	8.	1.17	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L232	0	234.	465.	-14.	3.	.83	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L356	0	235.	468.	-10.	3.	1.29	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L223	0	235.	451.	-27.	-2.	.66	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L650	0	239.	482.	4.	3.	1.08	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L148	0	239.	464.	-13.	-2.	.66	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L153	0	239.	460.	-17.	-4.	.74	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L139	0	242.	444.	-32.	-11.	.52	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L190C	0	242.	476.	-0.	-2.	.86	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L376	0	242.	469.	-8.	-4.	.78	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L213	+	244.	499.	22.	3.	1.22	35H	STIFFNESS, GURLEY (UNITS: MG/1X3 TEST PIECE), 20 C, 65% RH
L212	0	244.	524.	46.	10.	1.34	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L224	0	244.	524.	46.	10.	1.69	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L132	0	245.	456.	-19.	-10.	1.77	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L648	0	245.	530.	52.	10.	1.19	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L600	0	245.	482.	6.	-4.	1.00	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L260	0	248.	460.	-15.	-12.	.57	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L291	0	249.	478.	3.	-8.	.93	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L396	0	249.	454.	-20.	-15.	.74	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L382	0	251.	466.	-8.	-13.	.92	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L567	0	252.	434.	-38.	-23.	.79	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L183	0	258.	499.	26.	-11.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L121	0	262.	527.	54.	-7.	1.45	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L390	0	268.	499.	28.	-20.	1.37	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L195	*	271.	553.	81.	-8.	1.59	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L285	#	1150.	2380.	2082.	-333.	9.98	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
GMEANS:		241.	477.			1.00		
		95% ELLIPSE:		84.	32.	WITH GAMMA = 73 DEGREES		

STIFFNESS, GURLEY

SAMPLE J25 = 241. GURLEY UNITS SAMPLE J27 = 477. GURLEY UNITS



REPORT NO. 56S — TAPPI COLLABORATIVE REFERENCE PROGRAM — NOVEMBER 1978

ANALYSIS T36-1 TABLE 1

TABER STIFFNESS

TAPPI STANDARD T489 OS-76. RESULTS EXPRESSED IN GRAM CENTIMETERS

	SAMPLE	PRINTING				SAMPLE	KRAFT ENVELOPE				TEST D.= 10		
LAB	J69	149 GRAMS PER SQUARE METER				B63	124 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L107A	6.80	.81	1.02	.42	1.23	18.20	-.52	-.52	.63	.71	36T	0	L107A
L122	6.84	.85	1.07	.82	2.39	19.79	1.07	1.08	1.51	1.68	36T	0	L122
L123	5.90	-.09	-.11	.32	.93	18.20	-.52	-.52	.63	.71	36T	0	L123
L126	4.58	-1.41	-1.77	.25	.73	18.55	-.17	-.17	.60	.67	36T	0	L126
L150	6.20	.21	.27	.42	1.23	18.50	-.22	-.22	.71	.79	36T	0	L150
L163	6.03	.04	.05	.19	.57	18.50	-.22	-.22	.72	.80	36T	0	L163
L173B	7.22	1.23	1.55	.12	.36	18.28	-.44	-.44	.20	.23	36T	0	L173B
L182	5.97	-.02	-.02	.41	1.20	18.46	-.26	-.26	.70	.78	36T	0	L182
L207	7.18	1.19	1.50	.51	1.49	19.10	.39	.39	1.53	1.70	36T	0	L207
L212	5.08	-.91	-1.14	.30	.87	19.96	1.24	1.25	2.26	2.52	36T	0	L212
L228	4.88	-1.11	-1.39	.15	.45	18.80	.08	.08	1.46	1.62	36T	0	L228
L230	7.10	1.11	1.40	.57	1.66	21.30	2.58	2.59	1.95	2.17	36T	*	L230
L236	6.50	.51	.65	.24	.69	20.75	2.03	2.04	1.18	1.32	36T	0	L236
L242	5.97	-.01	-.01	.36	1.06	19.42	.71	.71	.64	.71	36T	0	L242
L260	6.28	.30	.38	.18	.54	19.14	.42	.42	.55	.61	36T	0	L260
L262	6.25	.26	.33	.26	.77	19.35	.63	.63	1.00	1.12	36T	0	L262
L268	6.02	.03	.04	.17	.49	18.57	-.15	-.15	.57	.64	36T	0	L268
L274	6.01	.02	.03	.14	.40	18.62	-.10	-.10	.59	.65	36T	0	L274
L281	4.92	-1.07	-1.35	.12	.35	19.15	.43	.43	.58	.64	36T	0	L281
L290	5.97	-.02	-.02	.46	1.34	17.60	-1.12	-1.12	1.07	1.20	36T	0	L290
L313	4.98	-1.01	-1.27	.19	.55	18.90	.18	.18	.74	.82	36T	0	L313
L318	5.90	-.09	-.11	.21	.62	17.65	-1.07	-1.07	.74	.82	36T	0	L318
L321	6.50	.51	.65	.99	2.89	17.87	-.84	-.85	.84	.94	36T	0	L321
L324	5.26	-.73	-.92	.20	.59	19.25	.53	.53	.89	.99	36T	0	L324
L339	4.40	-1.59	-2.00	.23	.67	53.19	34.47	34.60	3.21	3.58	36T	#	L339
L388	5.33	-.65	-.82	.24	.69	29.55	10.83	10.87	1.14	1.27	36T	#	L388
L484	4.07	-1.92	-2.42	.26	.77	16.35	-2.37	-2.38	.35	.39	36T	*	L484
L570	6.60	.61	.77	.52	1.51	18.70	-.02	-.02	.82	.92	36T	0	L570
L580	6.10	.11	.14	.32	.93	18.80	.08	.08	.79	.88	36T	0	L580
L616	5.80	-.19	-.24	.48	1.41	17.77	-.95	-.95	.56	.63	36T	0	L616
L651	6.70	.71	.90	.48	1.41	17.30	-1.42	-1.42	1.70	1.90	36T	0	L651

GR. MEAN = 5.99 TABER UNITS — GRAND MEAN = 18.72 TABER UNITS — TEST DETERMINATIONS = 10

SD MEANS = .79 TABER UNITS — SD OF MEANS = 1.00 TABER UNITS — 29 LABS IN GRAND MEANS

AVERAGE SDR = .34 TABER UNITS — AVERAGE SDR = .90 TABER UNITS

L250	4.36	-1.63	-2.05	.15	.44	17.50	-1.22	-1.22	.71	.79	36U	*	L250

TOTAL NUMBER OF LABORATORIES REPORTING = 32

Best values: J69 6.1 ± 1.2 Taber units
B63 18.8 ± 1.4 Taber units

The following laboratories were omitted from the grand means because of extreme test results: 339, 388.

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                                    TAPPI COLLABORATIVE REFERENCE PROGRAM
                                          ANALYSIS T36-1  TABLE 2
                                              TABER STIFFNESS
                     TAPPI STANDARD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB          MEANS        COORDINATES    AVG
CODE  F    J69     B63    MAJOR   MINOR  R.SDR VAR    PROPERTY---TEST INSTRUMENT---CONDITIONS

L484  *    4.07  16.35    -2.95     .75    .58 36T STIFFNESS, TABER
L250  +    4.36  17.50    -1.79     .97    .61 36U STIFFNESS, TABER, 20 C, 65% RH
L339  #    4.40  53.19    30.63   15.90   2.12 36T STIFFNESS, TABER
L126  0    4.58  18.55     -.74    1.21    .70 36T STIFFNESS, TABER
L228  0    4.88  18.80     -.39    1.04   1.04 36T STIFFNESS, TABER

L281  0    4.92  19.15     -.06    1.15    .50 36T STIFFNESS, TABER
L313  0    4.98  18.90     -.26     .99    .69 36T STIFFNESS, TABER
L212  0    5.08  19.96      .75    1.34   1.70 36T STIFFNESS, TABER
L324  0    5.26  19.25      .18     .88    .79 36T STIFFNESS, TABER
L388  #    5.33  29.55     9.56    5.14    .98 36T STIFFNESS, TABER

L616  0    5.80  17.77     -.94    -.23   1.02 36T STIFFNESS, TABER
L318  0    5.90  17.65    -1.01    -.37    .72 36T STIFFNESS, TABER
L123  0    5.90  18.20     -.51    -.14    .82 36T STIFFNESS, TABER
L182  0    5.97  18.46     -.24    -.09    .99 36T STIFFNESS, TABER
L290  0    5.97  17.60    -1.02    -.45   1.27 36T STIFFNESS, TABER

L242  0    5.97  19.42      .64     .31    .88 36T STIFFNESS, TABER
L274  0    6.01  18.62     -.08    -.06    .53 36T STIFFNESS, TABER
L268  0    6.02  18.57     -.12    -.09    .57 36T STIFFNESS, TABER
L163  0    6.03  18.50     -.18    -.13    .69 36T STIFFNESS, TABER
L580  0    6.10  18.80      .12    -.07    .90 36T STIFFNESS, TABER

L150  0    6.20  18.50     -.11    -.29   1.01 36T STIFFNESS, TABER
L262  0    6.25  19.35      .68     .03    .94 36T STIFFNESS, TABER
L260  0    6.28  19.14      .51    -.09    .58 36T STIFFNESS, TABER
L321  0    6.50  17.87     -.55    -.82   1.91 36T STIFFNESS, TABER
L236  0    6.50  20.75     2.06     .39   1.01 36T STIFFNESS, TABER

L570  0    6.60  18.70      .24    -.56   1.21 36T STIFFNESS, TABER
L651  0    6.70  17.30     -.99   -1.24   1.66 36T STIFFNESS, TABER
L107A 0    6.80  18.20     -.13    -.96    .97 36T STIFFNESS, TABER
L122  0    6.84  19.79     1.33    -.33   2.03 36T STIFFNESS, TABER
L230  *    7.10  21.30     2.81     .07   1.92 36T STIFFNESS, TABER

L207  0    7.18  19.10      .85    -.92   1.60 36T STIFFNESS, TABER
L173B 0    7.22  18.28      .12   -1.30    .29 36T STIFFNESS, TABER

GMEANS:    5.99  18.72                    1.00
           95% ELLIPSE:    2.76    1.92   WITH GAMMA = 65 DEGREES
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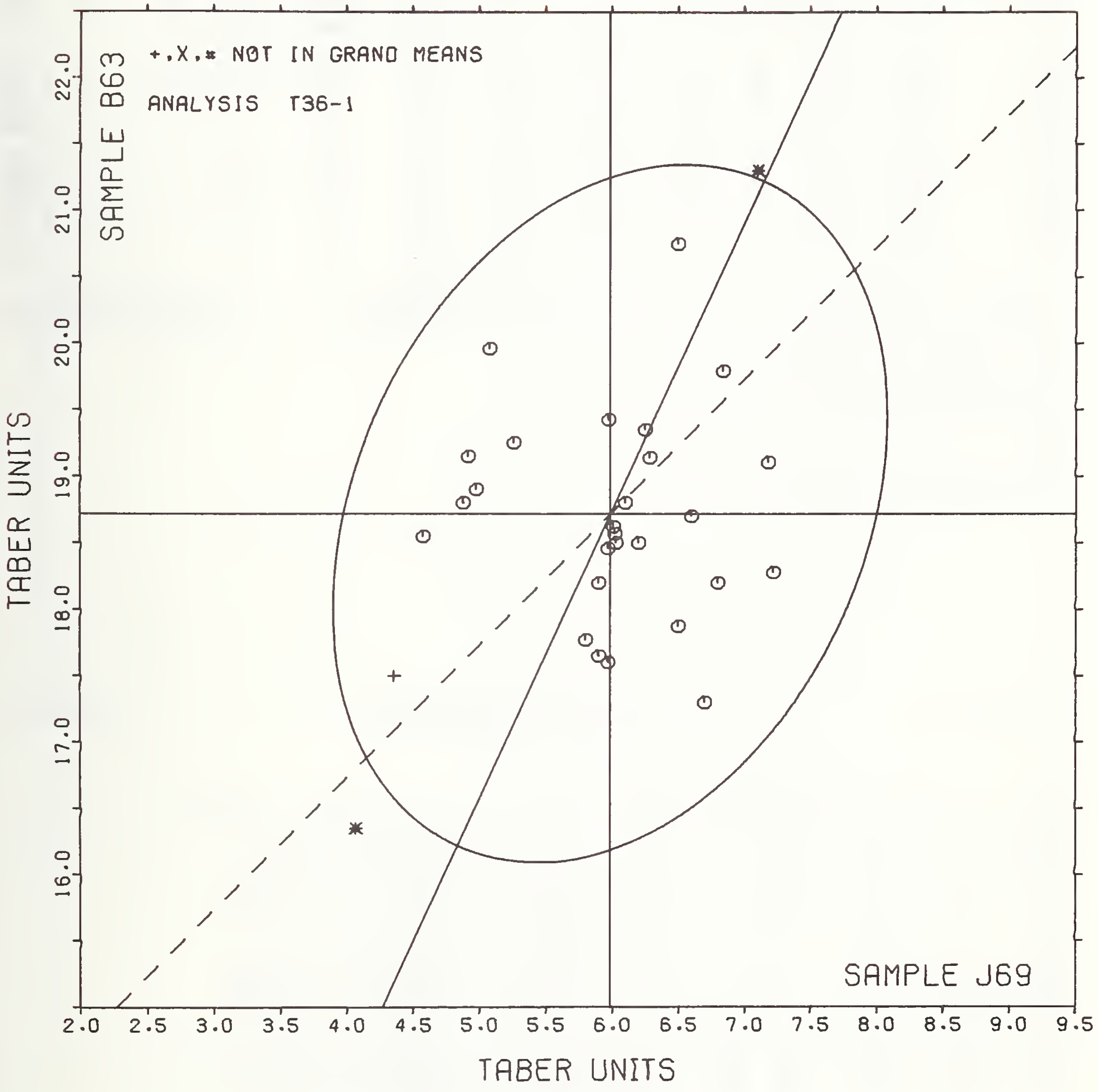
STIFFNESS, TABER

SAMPLE J69 = 6.0 TABER UNITS SAMPLE B63 = 18.7 TABER UNITS



REPORT NO. 56S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T49-1 TABLE 1
SURFACE PICK STRENGTH, IGT

NOVEMBER 1978

LAB	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D.= 4		
	J51	89 GRAMS PER SQUARE METER				J53	149 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L122	51.8	-24.2	-1.16	1.2	.28	59.6	-20.4	-1.18	.8	.15	49Q	0	L122
L149	60.3	-15.7	-.75	3.9	.87	70.4	-9.6	-.55	8.5	1.63	49L	0	L149
L182I	22.6	-53.4	-2.56	.8	.17	24.1	-55.9	-3.24	1.6	.31	49Q	#	L182I
L190C	48.0	-28.0	-1.34	2.4	.54	52.7	-27.2	-1.58	2.6	.50	49T	0	L190C
L207	114.5	38.5	1.85	11.1	2.46	108.7	28.8	1.66	21.2	4.06	49I	0	L207
L242	62.5	-13.5	-.65	5.0	1.11	120.0	40.0	2.32	21.2	4.07	49F	#	L242
L243	92.8	16.8	.80	6.3	1.39	85.2	5.2	.30	7.0	1.35	49T	0	L243
L274	75.9	-.1	-.01	.0	.00	75.9	-4.1	-.24	.0	.00	49I	0	L274
L280	284.2	208.2	9.99	16.0	3.57	371.0	291.0	16.84	.0	.00	49U	#	L280
L291	77.8	1.8	.09	2.0	.44	90.6	10.6	.61	1.7	.33	49I	0	L291
L388	89.1	13.1	.63	10.3	2.30	94.5	14.5	.84	10.3	1.98	49Q	0	L388
L484	107.2	31.2	1.50	2.5	.56	160.0	80.0	4.63	5.0	.97	49P	#	L484
L598	111.8	35.8	1.72	8.8	1.96	152.1	72.1	4.17	11.0	2.11	49P	#	L598
L616	88.3	12.2	.59	7.7	1.71	92.1	12.1	.70	.0	.00	49M	0	L616
L643	61.7	-14.3	-.69	.0	.00	70.1	-9.9	-.57	.0	.00	49I	0	L643
L651	203.0	127.0	6.09	.0	.00	203.0	123.0	7.12	.0	.00	49F	#	L651

GR. MEAN = 76.0 KP CM/SEC   GRAND MEAN = 80.0 KP CM/SEC   TEST DETERMINATIONS = 4
SD MEANS = 20.8 KP CM/SEC   SD OF MEANS = 17.3 KP CM/SEC   10 LABS IN GRAND MEANS
AVERAGE SDR = 4.5 KP CM/SEC   AVERAGE SDR = 5.2 KP CM/SEC
TOTAL NUMBER OF LABORATORIES REPORTING = 16

Data from the following laboratories were omitted from the grand means because no viscosity values were reported: 242, 280, 484, 651. The data from these labs were converted to the common unit, cm/sec.

Data from the following laboratories were omitted from the grand means because the values were outside the range of the instrument: 182I, 598.

REPORT NO. 56S

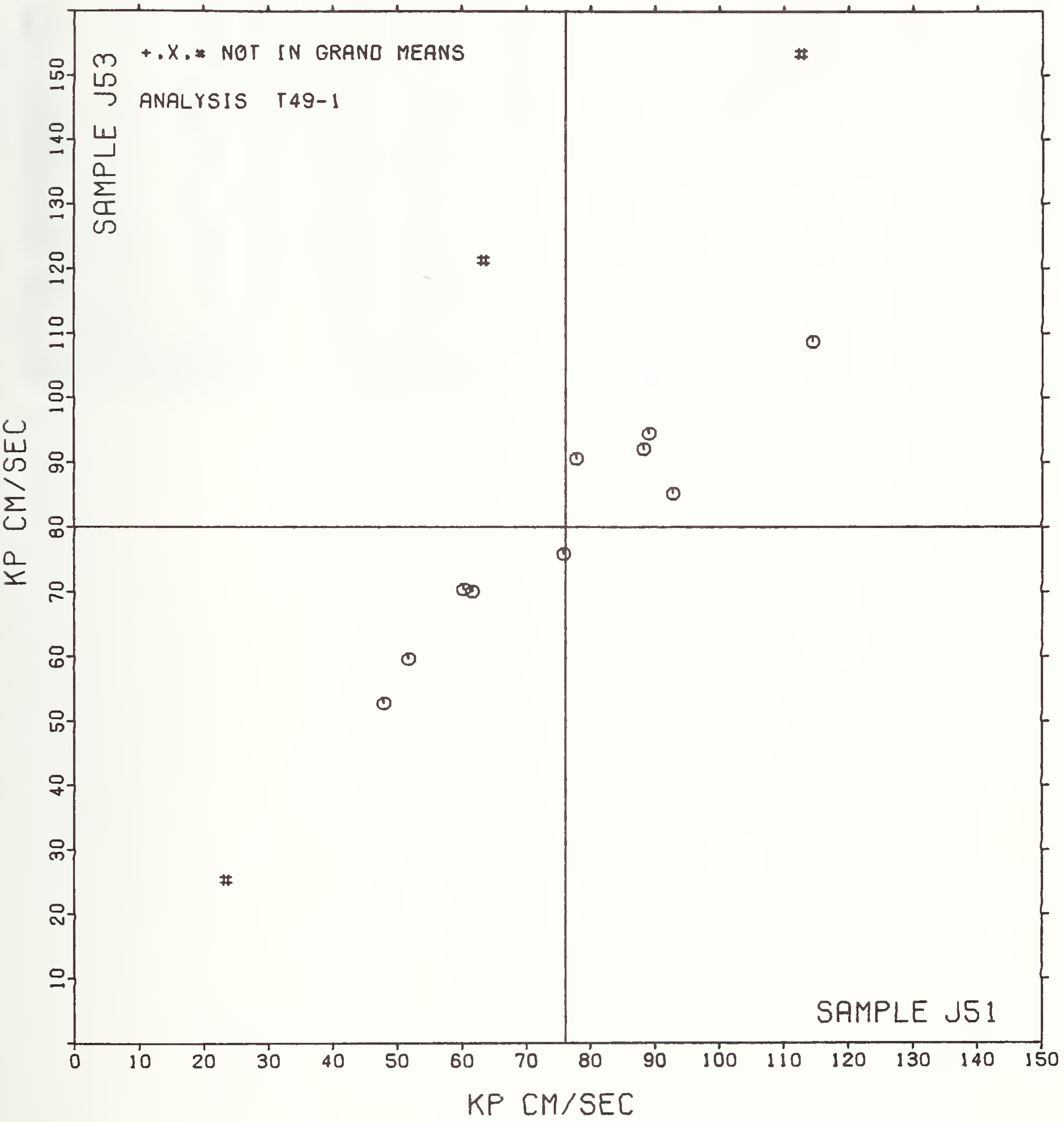
TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T49-1 TABLE 2
SURFACE PICK STRENGTH, IGT

NOVEMBER 1978

LAB		MEANS		COORDINATES		AVG		
CODE	P	J51	J53	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L182I	#	22.6	24.1	-76.8	-9.3	.24	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L190C	0	48.0	52.7	-38.9	-3.2	.52	49T	SURFACE PICK STRENGTH,IGT, IPC FLUID
L122	0	51.8	59.6	-31.6	-.4	.21	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L149	0	60.3	70.4	-18.2	2.6	1.25	49L	SURFACE PICK STRENGTH,IGT, PIB FLUID
L643	0	61.7	70.1	-17.4	1.5	.00	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L242	#	62.5	120.0	15.0	39.5	2.59	49F	SURFACE PICK STRENGTH,IGT, IGT OIL
L274	0	75.9	75.9	-2.7	-3.1	.00	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L291	0	77.8	90.6	8.1	7.0	.39	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L616	0	88.3	92.1	17.1	1.6	.85	49M	SURFACE PICK STRENGTH,IGT, PIB FLUID
L388	0	89.1	94.5	19.3	2.9	2.14	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L243	0	92.8	85.2	16.3	-6.6	1.37	49T	SURFACE PICK STRENGTH,IGT, IPC FLUID
L484	#	107.2	160.0	74.9	42.0	.76	49P	SURFACE PICK STRENGTH,IGT, IGT OIL
L598	#	111.8	152.1	73.4	33.0	2.04	49P	SURFACE PICK STRENGTH,IGT, IGT OIL
L207	0	114.5	108.7	48.0	-2.2	3.26	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L651	#	203.0	203.0	176.2	14.4	.00	49F	SURFACE PICK STRENGTH,IGT, INK
L280	#	284.2	371.0	345.7	92.5	1.78	49U	SURFACE PICK STRENGTH,IGT, OIL
GMEANS:		76.0	80.0			1.00		
		95% ELLIPSE:		84.8	12.4	WITH GAMMA = 39 DEGREES		

SURFACE PICK STRENGTH, IGT

SAMPLE J51 = 76. KP CM/SEC SAMPLE J53 = 80. KP CM/SEC



ANALYSIS T50-1 TABLE 1
SURFACE PICK STRENGTH, WAX NUMBER
TAPPI STANDARD T459 OS-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D. = 5		
	J51	89 GRAMS PER SQUARE METER				J53	149 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	9.40	.30	.62	.89	1.91	11.00	.93	1.34	.71	1.64	50W	0	L105
L122	7.00	-2.10	-4.34	.00	.00	8.40	-1.67	-2.43	.89	2.08	50W	#	L122
L162	9.00	-.10	-.21	.00	.00	10.00	-.07	-.11	.71	1.64	50W	0	L162
L173A	8.60	-.50	-1.03	.55	1.17	9.60	-.48	-.69	.55	1.27	50W	0	L173A
L182W	8.40	-.70	-1.45	.55	1.17	9.80	-.27	-.40	.84	1.95	50W	0	L182W
L183	9.20	.10	.21	.45	.96	10.00	-.07	-.11	.00	.00	50W	0	L183
L195	9.00	-.10	-.21	.71	1.51	10.00	-.07	-.11	.71	1.64	50W	0	L195
L213	9.00	-.10	-.21	.00	.00	11.00	.93	1.34	.00	.00	50W	0	L213
L225	9.40	.30	.62	.55	1.17	10.20	.13	.18	.45	1.04	50W	0	L225
L228	9.00	-.10	-.21	.71	1.51	8.60	-1.48	-2.14	.55	1.27	50W	0	L228
L230	9.20	.10	.21	.84	1.79	9.20	-.88	-1.27	.45	1.04	50W	0	L230
L236	9.60	.50	1.03	.55	1.17	10.00	-.07	-.11	.00	.00	50W	0	L236
L274	9.00	-.10	-.21	.00	.00	10.00	-.07	-.11	.00	.00	50W	0	L274
L285	10.00	.90	1.86	.71	1.51	10.80	.73	1.05	.84	1.95	50W	0	L285
L339	9.60	.50	1.03	.55	1.17	9.40	-.67	-.98	.55	1.27	50W	0	L339
L366	9.20	.10	.21	.45	.96	10.60	.52	.76	.55	1.27	50W	0	L366
L567	8.00	-1.10	-2.27	.00	.00	11.00	.93	1.34	.00	.00	50W	0	L567
L616	12.00	2.90	5.99	.71	1.51	11.40	1.33	1.92	.89	2.08	50W	#	L616

GR. MEAN = 9.10 WAX NUMBER GRAND MEAN = 10.07 WAX NUMBER TEST DETERMINATIONS = 5
SD MEANS = .48 WAX NUMBER SD OF MEANS = .69 WAX NUMBER 16 LABS IN GRAND MEANS
AVERAGE SDR = .47 WAX NUMBER AVERAGE SDR = .43 WAX NUMBER
TOTAL NUMBER OF LABORATORIES REPORTING = 18

Best values: J51 9.0 ± 0.9 wax number
J53 10.0 ± 1.0 wax number

The following laboratories were omitted from the grand means because of extreme test results: 616.

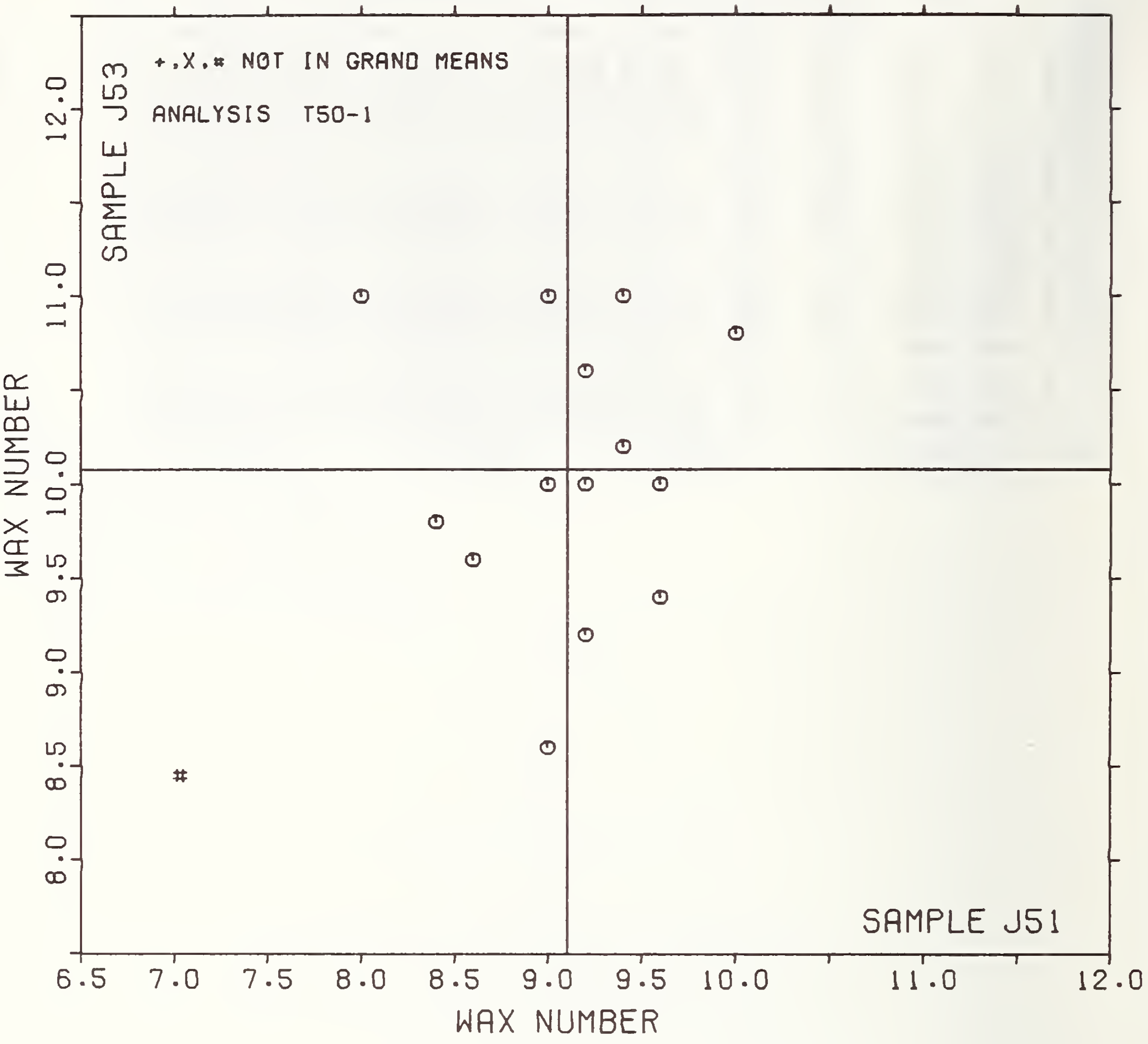
TAPPI COLLABORATIVE REFERENCE PROGRAM

ANALYSIS T50-1 TABLE 2
SURFACE PICK STRENGTH, WAX NUMBER
TAPPI STANDARD T459 0S-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	P	MEANS J51	MEANS J53	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L122	#	7.00	8.40	-1.70	2.08	1.04	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L567	0	8.00	11.00	.91	1.11	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L182W	0	8.40	9.80	-.28	.70	1.56	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L173A	0	8.60	9.60	-.48	.49	1.22	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L274	0	9.00	10.00	-.08	.10	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L162	0	9.00	10.00	-.08	.10	.82	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L228	0	9.00	8.60	-1.48	.08	1.39	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L195	0	9.00	10.00	-.08	.10	1.58	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L213	0	9.00	11.00	.92	.11	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L366	0	9.20	10.60	.53	-.09	1.11	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L183	0	9.20	10.00	-.07	-.10	.48	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L230	0	9.20	9.20	-.87	-.11	1.41	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L105	0	9.40	11.00	.93	-.29	1.78	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L225	0	9.40	10.20	.13	-.30	1.11	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L236	0	9.60	10.00	-.07	-.50	.59	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L339	0	9.60	9.40	-.67	-.51	1.22	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L285	0	10.00	10.80	.73	-.89	1.73	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
L616	#	12.00	11.40	1.36	-2.89	1.80	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 0S75)
GMEANS:		9.10	10.07			1.00		
		95% ELLIPSE:		1.95	1.37	WITH GAMMA = 89 DEGREES		

SURFACE PICK STRENGTH, WAX

SAMPLE J51 = 9.1 WAX NUMBER SAMPLE J53 = 10.1 WAX NUMBER



REPORT NO. 56S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T91-1 TABLE 1
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

NOVEMBER 1978

TEST D. = 10

LAB	SAMPLE E84	KRAFT 126 GRAMS PER SQUARE METER				SAMPLE E67	KRAFT 143 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L182	336.	40.	1.22	17.	.91	177.	-1.	-.06	12.	1.12	91N	0	L182
L185	319.	23.	.71	25.	1.36	192.	14.	1.02	8.	.80	91A	0	L185
L218	306.	10.	.31	12.	.65	165.	-13.	-.99	9.	.82	91A	0	L218
L242	242.	-54.	-1.64	10.	.54	170.	-8.	-.58	12.	1.13	91G	0	L242
L248	321.	26.	.78	18.	.99	195.	16.	1.22	10.	.97	91H	0	L248
L255	244.	-52.	-1.57	12.	.67	181.	3.	.20	5.	.49	91P	0	L255
L269	291.	-5.	-.15	20.	1.08	174.	-4.	-.30	9.	.86	91P	0	L269
L274	301.	5.	.15	9.	.48	181.	3.	.23	7.	.62	91P	0	L274
L280	278.	-18.	-.54	15.	.79	165.	-13.	-.96	17.	1.57	91N	0	L280
L289	272.	-24.	-.73	16.	.89	186.	8.	.57	16.	1.55	91P	0	L289
L329	272.	-24.	-.72	52.	2.80	164.	-15.	-1.09	13.	1.25	91P	0	L329
L394	299.	3.	.10	19.	1.03	168.	-11.	-.79	10.	.91	91P	0	L394
L621	317.	22.	.66	21.	1.14	186.	7.	.56	14.	1.35	91P	0	L621
L622	308.	12.	.38	20.	1.09	182.	4.	.27	6.	.61	91P	0	L622
L650	363.	67.	2.04	18.	.99	209.	30.	2.26	9.	.88	91N	0	L650
L665	263.	-32.	-.99	11.	.59	158.	-21.	-1.55	11.	1.06	91N	0	L665

GR. MEAN = 296. NEWTONS
SD MEANS = 33. NEWTONS
AVERAGE SDR = 18. NEWTONS
GR. MEAN = 66.49 POUNDS

GRAND MEAN = 178. NEWTONS
SD OF MEANS = 13. NEWTONS
AVERAGE SDR = 11. NEWTONS
GRAND MEAN = 40.09 POUNDS

TEST DETERMINATIONS = 10
16 LABS IN GRAND MEANS

L313	32.	-264.	-8.06	3.	.15	18.	-161.	-11.98	2.	.23	91X	*	L313

TOTAL NUMBER OF LABORATORIES REPORTING = 17

Best values: E84 300 ± 50 newtons
E67 180 ± 20 newtons

REPORT NO. 56S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T91-1 TABLE 2
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

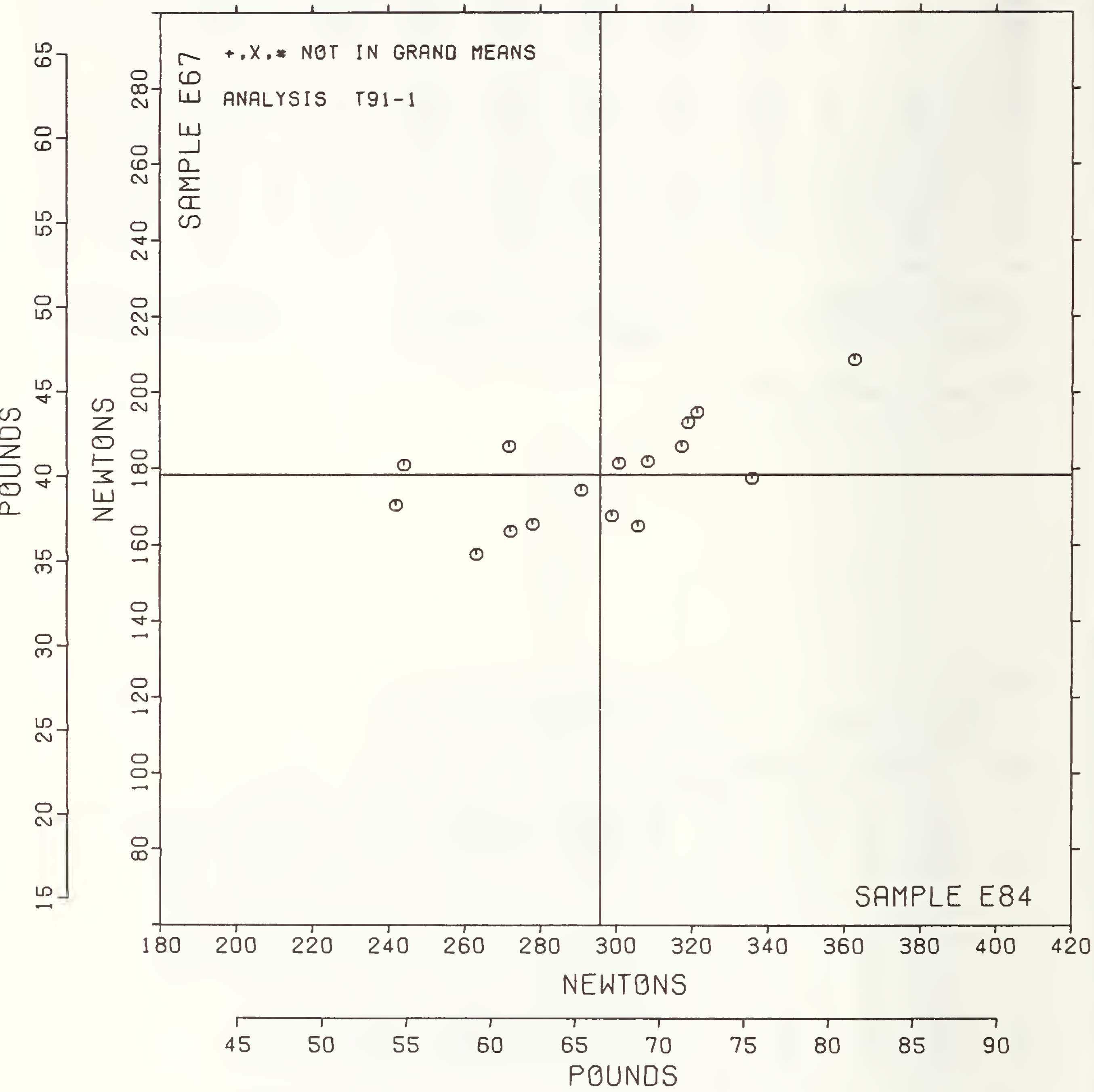
NOVEMBER 1978

LAB		MEANS		COORDINATES		AVG		
CODE	P	E84	E67	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L313	*	32.	18.	-298.	-82.	.19	91X	FLAT CRUSH STRENGTH, CONCORA: GIVE METHOD=INSTR.MAKE & MODEL
L242	0	242.	170.	-54.	7.	.84	91G	FLAT CRUSH STRENGTH, CONCORA, GAYDON FLAT CRUSH TESTER
L255	0	244.	181.	-49.	17.	.58	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L665	0	263.	158.	-37.	-11.	.82	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L289	0	272.	186.	-21.	14.	1.22	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L329	0	272.	164.	-27.	-8.	2.03	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L280	0	278.	165.	-21.	-7.	1.18	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L269	0	291.	174.	-6.	-2.	.97	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L394	0	299.	168.	0.	-11.	.97	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L274	0	301.	181.	6.	2.	.55	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L218	0	306.	165.	6.	-16.	.73	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L622	0	308.	182.	13.	0.	.85	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L621	0	317.	186.	23.	1.	1.25	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L185	0	319.	192.	26.	7.	1.08	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L248	0	321.	195.	29.	9.	.98	91H	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L182	0	336.	177.	38.	-12.	1.01	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L650	0	363.	209.	73.	11.	.94	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
GMEANS:		296.	178.			1.00		
		95% ELLIPSE:		96.	28.	WITH GAMMA = 15 DEGREES		

CONCORA (CMT)

SAMPLE E84 = 296. NEWTONS
SAMPLE E84 = 66.5 POUNDS

SAMPLE E67 = 178. NEWTONS
SAMPLE E67 = 40.1 POUNDS



REPORT NO. 56S

NOVEMBER 1978

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T96-1 TABLE 1
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T818 OS-76

	SAMPLE	KRAFT				SAMPLE	KRAFT				TEST D. = 10		
LAB	E84	126 GRAMS PER SQUARE METER				E67	143 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L107	120.	-38.	-1.73	10.	.85	183.	-47.	-1.52	14.	.87	96P	0	L107
L114	145.	-12.	-.56	9.	.75	196.	-34.	-1.09	11.	.67	96P	0	L114
L122	113.	-45.	-2.06	18.	1.47	178.	-52.	-1.67	22.	1.36	96P	0	L122
L124	153.	-4.	-.17	15.	1.29	223.	-7.	-.22	20.	1.21	96P	0	L124
L126	174.	16.	.76	12.	1.03	267.	36.	1.16	15.	.89	96P	0	L126
L141	168.	11.	.49	7.	.61	216.	-14.	-.44	19.	1.16	96P	0	L141
L171	173.	15.	.71	10.	.87	260.	30.	.97	11.	.65	96N	0	L171
L182	169.	12.	.57	12.	.99	258.	28.	.88	14.	.85	96N	0	L182
L191	177.	20.	.93	17.	1.41	209.	-22.	-.69	28.	1.69	96P	0	L191
L234	157.	-0.	-.01	15.	1.24	196.	-35.	-1.10	26.	1.59	96P	0	L234
L237	155.	-2.	-.09	8.	.67	254.	24.	.77	21.	1.25	96P	0	L237
L242	214.	57.	2.62	10.	.88	296.	66.	2.12	13.	.77	96G	0	L242
L274	134.	-23.	-1.08	7.	.59	214.	-16.	-.52	5.	.32	96P	0	L274
L305	149.	-8.	-.36	17.	1.39	243.	13.	.42	17.	1.01	96P	0	L305
L329	173.	16.	.75	13.	1.09	246.	15.	.49	25.	1.51	96P	0	L329
L333	142.	-15.	-.69	16.	1.34	204.	-26.	-.83	20.	1.22	96I	0	L333
L336	131.	-26.	-1.20	8.	.68	192.	-38.	-1.22	9.	.52	96P	0	L336
L350	179.	22.	.99	9.	.76	259.	29.	.92	15.	.89	96P	0	L350
L393	168.	11.	.50	9.	.78	222.	-9.	-.28	21.	1.26	96P	0	L393
L484	148.	-9.	-.42	10.	.81	208.	-22.	-.71	15.	.88	96R	0	L484
L553	168.	11.	.50	18.	1.46	283.	53.	1.68	14.	.85	96P	0	L553
L562	151.	-6.	-.28	23.	1.96	242.	12.	.38	29.	1.75	96P	0	L562
L570	129.	-28.	-1.30	10.	.80	226.	-4.	-.12	9.	.53	96P	0	L570
L603	143.	-14.	-.65	13.	1.09	226.	-5.	-.15	19.	1.14	96P	0	L603
L617	164.	7.	.31	17.	1.44	202.	-28.	-.90	11.	.65	96I	0	L617
L621	136.	-21.	-.97	9.	.73	200.	-30.	-.97	14.	.84	96P	0	L621
L623	184.	26.	1.22	12.	.99	277.	46.	1.48	10.	.62	96P	0	L623
L649	168.	11.	.50	9.	.76	225.	-6.	-.18	9.	.56	96P	0	L649
L650	189.	32.	1.49	10.	.88	278.	47.	1.51	18.	1.11	96N	0	L650
L663	154.	-3.	-.15	8.	.64	224.	-6.	-.19	18.	1.08	96P	0	L663
L676	144.	-14.	-.63	9.	.74	231.	1.	.02	21.	1.28	96P	0	L676

GR. MEAN = 157. NEWTONS GRAND MEAN = 230. NEWTONS TEST DETERMINATIONS = 10
SD MEANS = 22. NEWTONS SD OF MEANS = 31. NEWTONS 31 LABS IN GRAND MEANS
AVERAGE SDR = 12. NEWTONS AVERAGE SDR = 16. NEWTONS
GR. MEAN = 35.35 POUNDS GRAND MEAN = 51.76 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING = 31

Best values: E84 160 ± 30 newtons
E67 230 ± 50 newtons

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T96-1 TABLE 2
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T818 OS-76

LAB CODE	F	MEANS E84	MEANS E67	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L122	0	113.	178.	-68.	10.	1.41	96P	RING CRUSH, TMI/HINDE & DAUCH
L107	0	120.	183.	-60.	7.	.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L570	0	129.	226.	-18.	22.	.67	96P	RING CRUSH, TMI/HINDE & DAUCH
L336	0	131.	192.	-46.	2.	.60	96P	RING CRUSH, TMI/HINDE & DAUCH
L274	0	134.	214.	-26.	11.	.46	96P	RING CRUSH, TMI/HINDE & DAUCH
L621	0	136.	200.	-37.	2.	.78	96P	RING CRUSH, TMI/HINDE & DAUCH
L333	0	142.	204.	-30.	-1.	1.28	96I	RING CRUSH, INSTRON
L603	0	143.	226.	-11.	9.	1.12	96P	RING CRUSH, TMI/HINDE & DAUCH
L676	0	144.	231.	-7.	12.	1.01	96P	RING CRUSH, TMI/HINDE & DAUCH
L114	0	145.	196.	-35.	-8.	.71	96P	RING CRUSH, TMI/HINDE & DAUCH
L484	0	148.	208.	-24.	-4.	.85	96R	RING CRUSH, REGMED
L305	0	149.	243.	7.	14.	1.20	96P	RING CRUSH, TMI/HINDE & DAUCH
L562	0	151.	242.	7.	11.	1.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L124	0	153.	223.	-8.	-0.	1.25	96P	RING CRUSH, TMI/HINDE & DAUCH
L663	0	154.	224.	-7.	-0.	.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L237	0	155.	254.	19.	15.	.96	96P	RING CRUSH, TMI/HINDE & DAUCH
L234	0	157.	196.	-29.	-18.	1.42	96P	RING CRUSH, TMI/HINDE & DAUCH
L617	0	164.	202.	-20.	-21.	1.04	96I	RING CRUSH, INSTRON
L141	0	168.	216.	-6.	-16.	.89	96P	RING CRUSH, TMI/HINDE & DAUCH
L649	0	168.	225.	1.	-12.	.66	96P	RING CRUSH, TMI/HINDE & DAUCH
L393	0	168.	222.	-2.	-14.	1.02	96P	RING CRUSH, TMI/HINDE & DAUCH
L553	0	168.	283.	50.	19.	1.16	96P	RING CRUSH, TMI/HINDE & DAUCH
L182	0	169.	258.	30.	4.	.92	96N	RING CRUSH, TMI/HINDE & DAUCH
L171	0	173.	260.	34.	3.	.76	96N	RING CRUSH, TMI/HINDE & DAUCH
L329	0	173.	246.	22.	-6.	1.30	96P	RING CRUSH, TMI/HINDE & DAUCH
L126	0	174.	267.	40.	5.	.96	96P	RING CRUSH, TMI/HINDE & DAUCH
L191	0	177.	209.	-8.	-29.	1.55	96P	RING CRUSH, TMI/HINDE & DAUCH
L350	0	179.	259.	36.	-3.	.83	96P	RING CRUSH, TMI/HINDE & DAUCH
L623	0	184.	277.	53.	2.	.81	96P	RING CRUSH, TMI/HINDE & DAUCH
L650	0	189.	278.	57.	-2.	.99	96N	RING CRUSH, TMI/HINDE & DAUCH
L242	0	214.	296.	86.	-13.	.82	96G	RING CRUSH, GAYDON FLAT CRUSH TESTER
GMEANS:		157.	230.			1.00		
		95% ELLIPSE:		95.	32.	WITH GAMMA = 58 DEGREES		

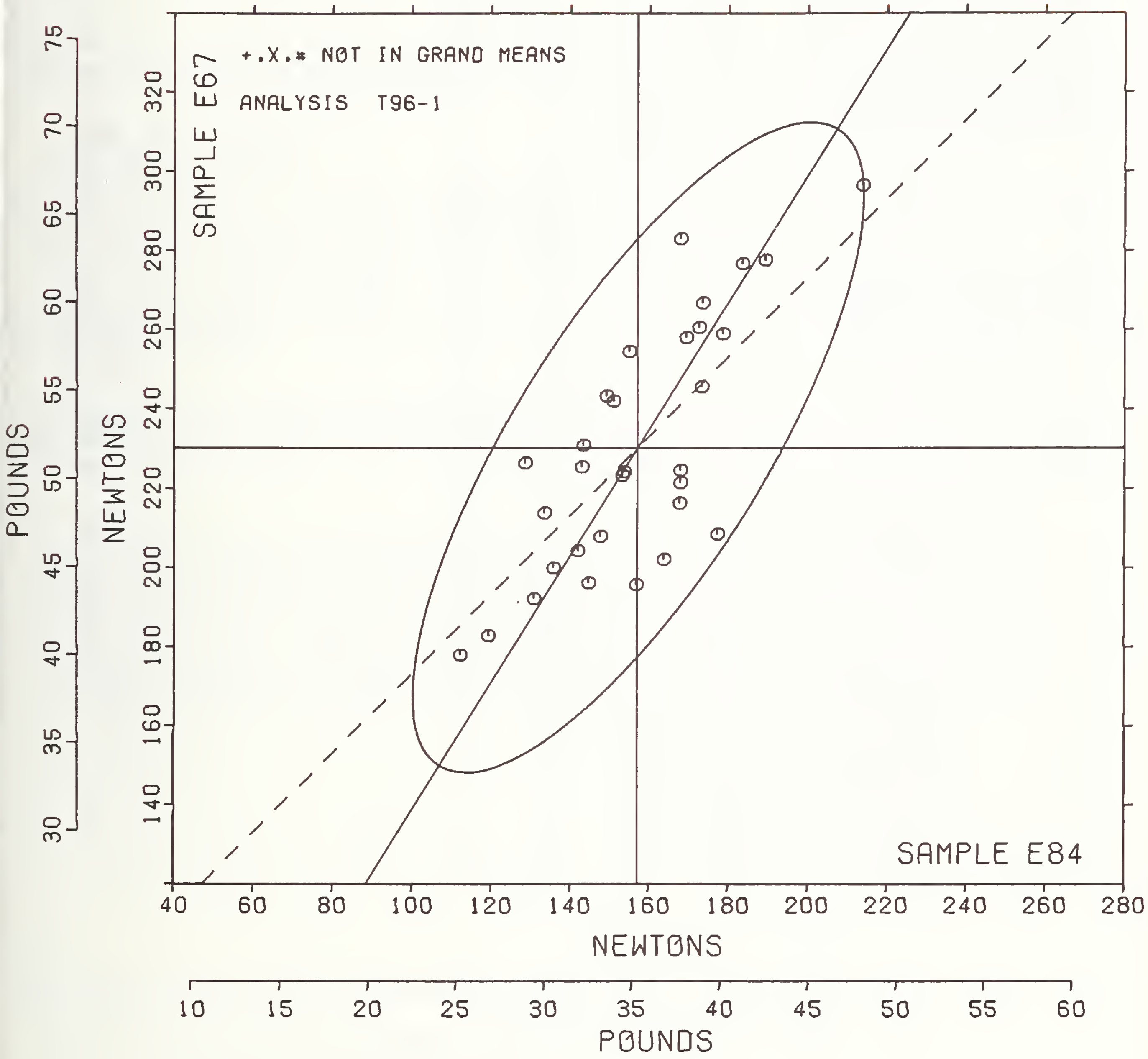
RING CRUSH

SAMPLE E84 = 157. NEWTONS

SAMPLE E84 = 35.3 POUNDS

SAMPLE E67 = 230. NEWTONS

SAMPLE E67 = 51.8 POUNDS



SUMMARY TABLE

TEST METHOD		SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
BURSTING STRENGTH, MODEL C		J39	29.20	1.70	1.55	15	39	50	10	1.36	4.77
T10-1	PSI	J67	16.66	1.55	1.11					.98	4.33
BURSTING STRENGTH, MODEL C-A		J39	29.3	1.5	1.5	15	29	32	10	1.3	4.1
T10-2	PSI	J67	17.3	1.2	1.2					1.1	3.3
BURSTING STRENGTH, HIGH RANGE		K29	59.3	2.3	4.2	15	26	40	10	3.6	6.6
T11-1	PSI	K27	50.3	2.4	3.7					3.3	6.9
TEARING STRENGTH, DEEP CUTOUT		E81	58.8	3.4	1.7	15	113	129	10	1.5	9.3
T15-1	GRAMS	K25	43.3	2.5	1.6					1.4	7.0
TEARING STRENGTH,NO CUTOUT		K19	147.2	9.9	6.7	15	13	13	10	5.8	27.6
T17-1	GRAMS	K35	120.1	9.0	4.2					3.6	25.2
TENSILE STRENGTH, PACKAGING PAPERS		K31	8.68	.34	.45	20	42	48	12	.36	.96
T19-1	KILONEWTON/M	K33	9.34	.38	.55					.44	1.09
TENSILE STRENGTH, CRE TYPE		J08	6.27	.39	.35	20	36	46	12	.28	1.09
T20-1	KILONEWTON/M	J06	5.40	.30	.23					.18	.85
TENSILE STRENGTH, PENDULUM TYPE		J08	6.42	.32	.38	20	33	36	12	.30	.91
T20-2	KILONEWTON/M	J06	5.51	.30	.26					.21	.83
T.E.A., PACKAGING PAPERS		K31	77.1	7.2	10.6	20	14	17	12	8.5	20.6
T25-1	JOULES/SQ M	K33	97.6	8.0	12.8					10.2	23.1
T.E.A., PRINTING PAPERS		J08	76.0	7.9	7.8	20	12	13	12	6.2	22.2
T26-1	JOULES/SQ M	J06	60.1	4.8	5.7					4.5	13.7
ELONGATION TO BREAK, PACKAGING PAPER		K31	1.518	.103	.118	20	13	18	12	.095	.292
T28-1	PERCENT	K33	1.676	.118	.136					.109	.333
ELONGATION TO BREAK, PRINTING PAPER		J08	1.819	.244	.141	20	13	16	12	.113	.680
T29-1	PERCENT	J06	1.680	.223	.119					.095	.619
FOLDING ENDURANCE (MIT)		J31	73.	15.	19.	15	40	44	10	17.	43.
T30-1	DOUBLE FOLDS	J30	32.	12.	21.					18.	34.
FOLDING ENDURANCE (MIT)		J31	1.84	.08	.12	15	39	44	10	.11	.23
T30-2	LOG(10) FOLD	J30	1.40	.13	.24					.21	.39
STIFFNESS, GURLEY		J25	241.	15.	11.	10	31	34	10	10.	41.
T35-1	GURLEY UNITS	J27	477.	31.	26.					22.	85.
STIFFNESS, TABER		J69	5.99	.79	.34	10	29	32	5	.42	2.22
T36-1	TABER UNITS	B63	18.72	1.00	.90					1.11	2.87
SURFACE PICK STRENGTH, IGT		J51	76.0	20.8	4.5	4	10	16	4	6.2	57.7
T49-1	KP CM/SEC	J53	80.0	17.3	5.2					7.2	47.9
SURFACE PICK STRENGTH, WAX		J51	9.10	.48	.47	5	16	18	5	.58	1.34
T50-1	WAX NUMBER	J53	10.07	.69	.43					.53	1.91
CONCORA (CMT)		B84	296.	33.	18.	10	16	17	10	16.	91.
T91-1	NEWTONS	B67	178.	13.	11.					9.	37.
RING CRUSH		B84	157.	22.	12.	10	31	31	10	10.	60.
T96-1	NEWTONS	B67	230.	31.	16.					14.	87.

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15. SUPPLEMENTARY NOTES

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

Collaborative Reference Programs provide participating laboratories with the means for checking periodically the level and uniformity of their testing in comparison with that of other participating laboratories. An important by-product of the programs is the provision of realistic pictures of the state of the testing art. This is one of the periodic reports showing averages for each participant, within and between laboratory variability, and other information for participants and standards committees.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Collaborative reference program; Laboratory evaluation; Paper; Precision; Reference samples, Testing calibration

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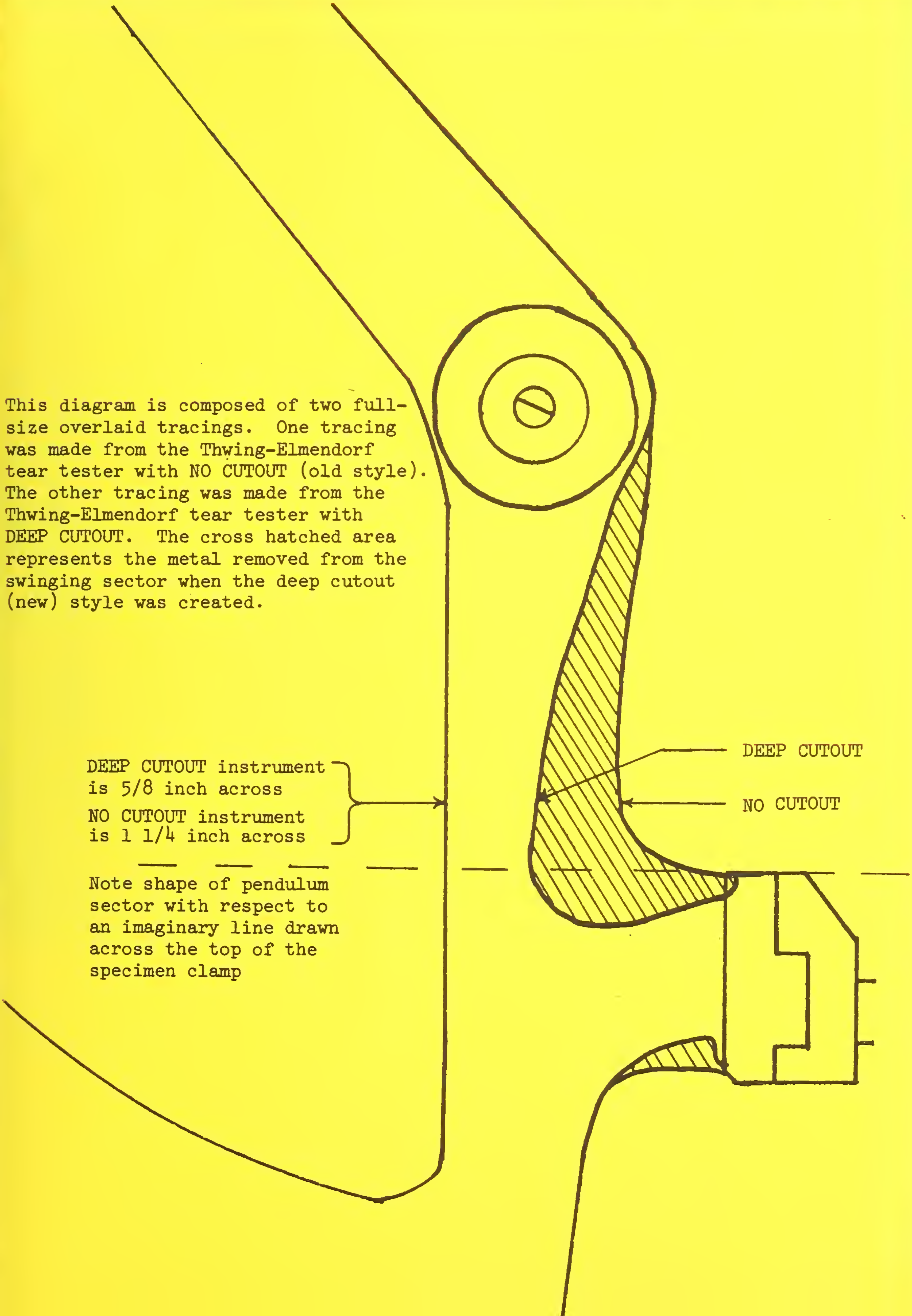
69

22. Price



This diagram is composed of two full-size overlaid tracings. One tracing was made from the Thwing-Elmendorf tear tester with NO CUTOUT (old style). The other tracing was made from the Thwing-Elmendorf tear tester with DEEP CUTOUT. The cross hatched area represents the metal removed from the swinging sector when the deep cutout (new) style was created.

DEEP CUTOUT instrument is 5/8 inch across

NO CUTOUT instrument is 1 1/4 inch across

Note shape of pendulum sector with respect to an imaginary line drawn across the top of the specimen clamp